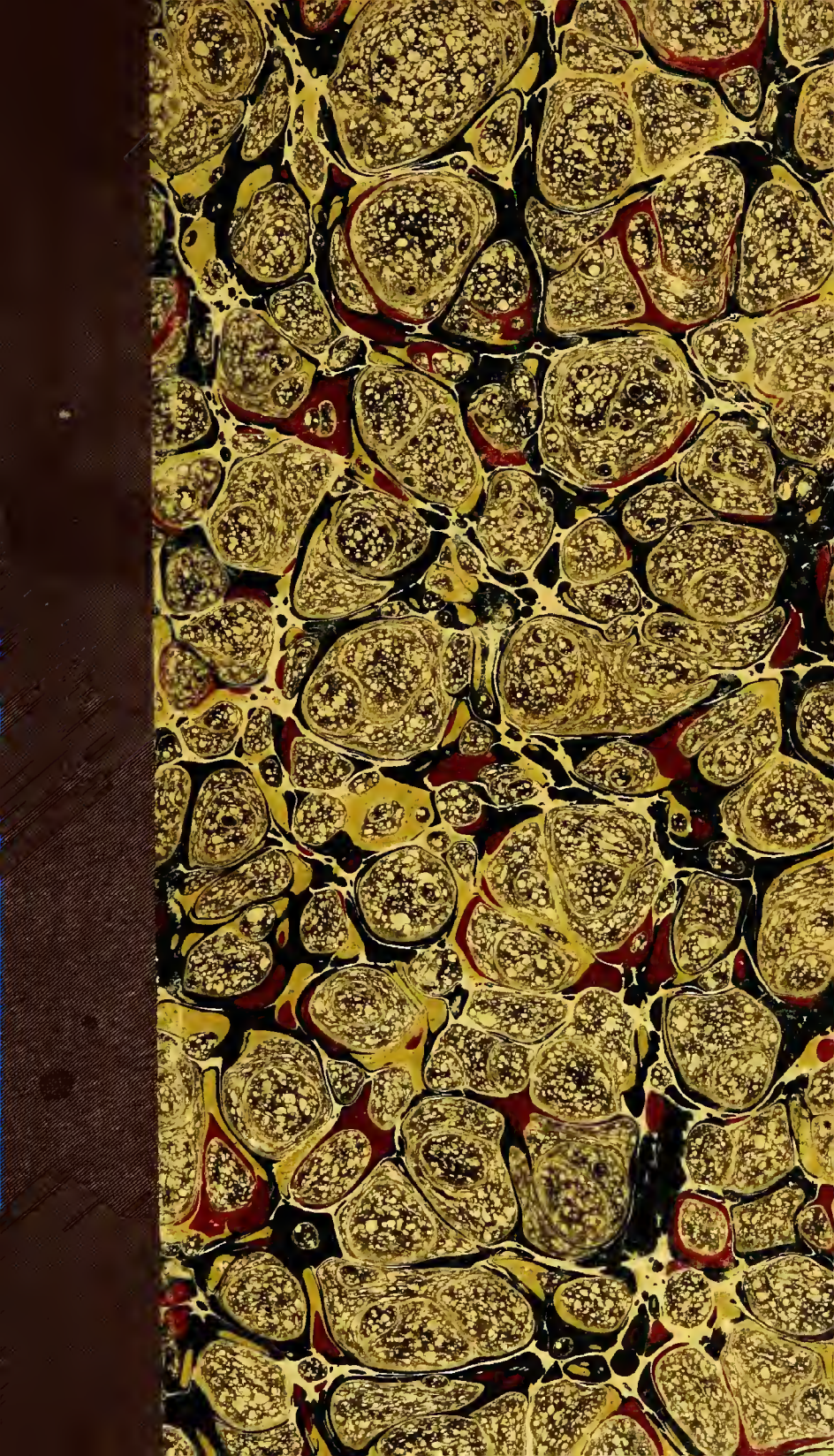




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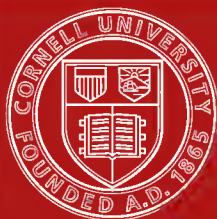
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[REPORT TO THE U. S. MILITARY GOVERNOR IN THE PHILIPPINES.]

THE COAL MEASURES

OF THE

PHILIPPINES.

A RAPID HISTORY OF THE DISCOVERY OF COAL IN THE ARCHIPELAGO
AND SUBSEQUENT DEVELOPMENTS,

WITH THE

FULL TEXT OF THE RECORD OF THE MACLEOD
COAL CONCESSION IN CEBU,

OR

THE ULING-LUTAC COAL AND RAILWAY CONCESSION.

COMPILED FROM OFFICIAL RECORDS BY

CHARLES H. BURRITT,

First Lieutenant, Eleventh Cavalry, U. S. V.,

OFFICER IN CHARGE THE MINING BUREAU.

WAR DEPARTMENT,

DIVISION OF INSULAR AFFAIRS,

AUGUST, 1901.

WASHINGTON:

GOVERNMENT PRINTING OFFICE.

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LETTER OF TRANSMITTAL.

OFFICE OF THE MINING BUREAU,
Manila, P. I., June 25, 1901.

SIR: I have the honor to transmit to you herewith a manuscript report, prepared in this office, touching the general subject of "The Coal Measures of the Philippines," and with it the full text of the record of the so-called "MacLeod coal concession in Cebu," or "Uling-Lutac coal and railway concession."

This report does not pretend to be an exhaustive study of the Philippine coal measures. That were impossible with the means at command. It is rather a review of the efforts made by Spain and the subjects of that country to develop the coal-mining industries, the methods pursued by them, the failures recorded, and the reasons for such failures as they appear to an outside critic who looks over the field after history has been made and the facts are weighed, free from the bias of personal ambition and pecuniary interest, and which forms the basis of all true history.

My purpose will be subserved if this work shall furnish a partial basis for the guidance of future examinations and developments, both from a scientific and industrial standpoint.

Very respectfully,

CHARLES H. BURRITT,
First Lieutenant, Eleventh Cavalry, U. S. V.,
Officer in Charge the Mining Bureau.

THE SECRETARY OF THE
U. S. MILITARY GOVERNOR IN THE PHILIPPINES.

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THE COAL MEASURES OF THE PHILIPPINES.

CHAPTER I.—GENERAL CLASSIFICATION OF COALS.

All coals are of vegetable origin: “All portions of a coal seam, even the most structureless to the naked eye, when properly prepared, reveal their vegetable structure to the microscope.” “Peat is vegetation which has undergone, in part, the change to coal, and, in some cases, it has become brown coal. The conditions of change are somewhat different from those of the beds of good coal, since in the case of peat the air has access, while in that of the coal the air was more or less excluded by overlying strata, and the more perfect the exclusion, other things equal, the better the coal.” (Le Conte.)

The other important elements that enter into the construction of coal and determine its quality and classification are heat and pressure; increased heat and pressure raising the quality of the coal.

“The manner or laying of the coal seams is uniform in all ages; resting upon a thin layer of clay called the under clay and above is usually a shale called the black shale or roof shale.” (Le Conte.)

For all practical purposes the varieties of coal may be fixed at four, namely: Anthracite, bituminous, cannel, and brown (or lignite) coal.

The compositions of these coals is here briefly stated, although, so far as yet discovered, it is only the brown coals or lignites that are known to exist in these islands.

Anthracite:	Per cent.
Fixed carbon	78 to 88
Volatile matter	3 to 7
Earthy impurities	4 to 12
Bituminous:	
Fixed carbon	75 to 85
Volatile matter	20 to 45
Earthy impurities	1.4 to 7.5
Cannel:	
Volatile matter	40 to 50
Lignite:	
Fixed carbon	52 to 65
Volatile matter	40 to 60
Earthy impurities	5 to 20

The above classifications and the figures given for their three principal ingredients are in a large measure arbitrary and are only useful for the purposes of a general comparison, since the Coal Measures are

not uniform in like geological formations, nor are there any two coal beds of the same class alike in every exact particular. One class of coal merges into another and the rates per cent of fixed carbon, volatile matter, and earthy impurities (ash) in the same Coal Measures, and even in the same coal seams, varies frequently; besides, there are found in different coals other impurities besides the earthy impurities or ash and all of which affect their value more or less commercially and industrially, such as sulphur, pyrites, etc.; the consideration of which in this connection are not important.

CHAPTER II.—HISTORICAL SKETCH OF DISCOVERY IN THE PHILIPPINES.

Accustomed as we are in this day to the extensive application of coal in the arts and industries, it is difficult for us to realize that while its discovery is ancient its use is comparatively modern; in fact, its application may be said to belong exclusively to the present day.

Coal was first discovered in the Philippines in the year 1827; this discovery was made in the island of Cebu, and, as stated by Abella, "did not succeed in inspiring any interest in the State nor in private individuals until the journey of the first steamships to the islands being announced, the superior civil government issued in the year 1842 a timely circular to the provincial authorities requesting them to furnish information regarding the coal deposits that might be in their respective localities."

The first inspector of mines of this archipelago was Isidro Sainz de Baranda. That gentleman disembarked at Manila on December 26, 1838, and on the 25th of January of the next year he commenced an active and vigorous campaign for the enactment of a law and for the establishment of the mining industry in these islands which, with the proverbial slowness of the ministry of colonies and Her Majesty's Government, seems to have been wholly without effect until the year 1846, when the first mining code was adopted and put into operation.

The real history of the department of mines and of the mining industry in the Philippines, therefore, dates from 1846. The work done prior to that time may be considered as preliminary.

The circular referred to by Abella was dated October 17, 1842, and was issued to the *alcaldes mayores* and others by Don Marcelino Oraa, the then governor and captain-general of these islands. Its special purpose was to obtain information of the existence of coal deposits and mines, the cost and means of transportation, and other facts relating thereto. The replies are many of them curious, and all are interesting; they possess, however, no value outside of their historical interest.

The *alcalde* of Zambales reports that "In the time of great freshets some pieces of black rocks that burn are accustomed to be seen in the

Bañanbacao River of Botolan," but that he has not been able to secure any of them because "none has been seen during the present year;" he promises the governor a trip to the mountains later in the year and a further report. He then branches off into a rosy account of his military operations against the infidels of the mountains, and reports two more towns in the mountains whose population have "submitted." In November he again reports that he has fulfilled his promise, but failed to find any of the "black rocks that burn," or where they came from; but he left word with the "lately submitted," "That in their trips they shall not neglect to collect every black and heavy rock they find in the rivers, and after applying to the fire if they find that it burns that they bring it to me instantly, and I do not doubt they will do so if they hit upon them."

In November the inspector of mines from Albay reports a deposit of coal on the island of Siargao, in the province of Caraga (now Surigao), and another on the island of Batan, then being worked by Mr. Jose Velarde, the governor of the province of Albay. The alcalde mayor of Pampanga reports a mineral found near San Miguel, that from the fact of its being heated red hot in a forge it remains so for a long time and communicates fire to combustible articles that are brought in contact with it, and also because of its solidity and hardness, "demonstrates that said samples might belong to the class of carbon minerals, although to be assured of its goodness," as the alcalde states, "the processes of chemical analysis would be indispensable, and for these I am lacking the agents and apparatus that belong to a laboratory."

The alcalde mayor of Batangas reports that at Maynit, in the town of Bauan, "there are found stones of different qualities, and among them are seen some that are half burned, which, in my judgment, might be coal; yet I doubt whether they might not be the effect of a volcano which is in their neighborhood." He promises to send some of the stones to Manila in order that they may be examined by men learned in science. The political military governor of Samar, with a commendable conservatism, reports a deposit at the Visitation of Loquilocon, in the town of Paranas, on that island, "where there is accustomed to be found between the earth of the channel that the river forms, a combustible which was like coal."

The other officials reported that they knew of no deposits of coal, and no coal mines in their jurisdictions.

The coal discoveries in the island of Cebu, known since 1827, had resulted in no efforts for their being regularly worked or developed, and, in fact, it was not until 1853 that the first coal concession was granted in that island.

The above notes on the original discovery were further increased by a report of the inspector of mines covering all the mineral resources

of the islands, made to the governor in 1844, in which he locates the known coal deposits as follows:

Province of Caraga: Island of Siargao.

Province of Albay: Island of Batan.

Province of Tayabas: Mauban and Antimonan (and a report that Señor Peñaranda had found a piece of coal in the Pagsanjan River, between the headlands of Bondoc and Punta Arenas).

Province of Bulacan: In the mountains of Angat.

Province of Pampanga: In the mountains of Camachin.

Province of Pangasinan: (Said to have been seen in the mountains of Bacnotan.)

This may be safely said to be the whole of the history of the discovery of coal in the Philippines, and the extent of the knowledge of the Government with reference thereto up to 1844. The next step in the history may be properly called a step of development. In closing this chapter on discovery, there are two pertinent statements in the report of Señor Baranda, from which we have just quoted, that are pertinent because of their general bearing upon the status and condition of the mining industry in these islands to-day, and because of their present suggestive value under conditions not to a great degree different from the conditions of 1844.

The first of these is:

It seems incredible that, notwithstanding it is now more than three centuries since the Philippines were discovered, their mineral wealth is yet unknown. However, nothing is more certain.

And the other is:

The greatest obstacle that exists in this day in order that there may be a resolution to develop the mining industry is the lack of a law. * * * It falls, then, to the lot of the Government alone to remove the obstacle which the nonexistence of some law presents.

While there are other interesting suggestions, and of much value, in this interesting paper of Señor Baranda, I shall not quote further from it at this point.

I again respectfully call attention to the above two quotations as showing how like the conditions of 1844 and 1901 in these islands, so far as the mining industry is concerned. It seems to be an illustration of that saying, "History repeats itself constantly, but nature never."

CHAPTER III.—FIRST STEPS IN DEVELOPMENT, 1846-1853.

This chapter will contain a brief and comprehensive review of the period between 1846 and 1853, at which latter date the second steps in development of coal mining were taken.

On January 29, 1846, the "Decree of the superior civil government" of that date was promulgated, putting into operation a complete mining code in the islands. This continued, subject to some slight

amendments, to be the law under which all mining was conducted until the 14th day of May, 1867, when it was superseded by the code that was found in force at the date of American occupation in 1898. This first code, hereafter referred to as the "Code of 1846," had much to commend it. Its language was clear, concise, and plain, and its definitions were comprehensive and sufficiently elastic to allow all the necessary latitude in the executive control. In my judgment, under honest administration, the "Code of 1846" is far superior, as a whole, to the more elaborate and extended "Code of 1867."

The "Code of 1846" was composed of 56 sections, and the quotation of article 2, defining minerals, is a fair illustration of its composition throughout:

ART. 2. The following are objects of mining: Precious stones and all substances properly metallic, combustible, and saline, whether encountered upon the surface of the earth or its interior.

By article 12 the sizes of mining claims are fixed at 200 Spanish yards in length, and half that width, for mines in general; while for veins of bituminous coal they shall be 600 yards long by 100 wide. On December 22, 1851, these sizes were changed by a royal order, and the coal claim was made 600 by 300 yards, and to include coal, lignite, and peat, and with permission to take as many as four claims to each mine.

These are all the essential features of the law required at this stage of the examination. Other provisions from the Code of 1846 will be incidentally referred to later in their proper connection.

This period may be considered the formative period in the way of development. Coal mines were being worked in the names of various claimants, but the works were all superficial and none of them advanced to the degree of a formal registration in the inspectorate of mines.

Under date of July 4, 1847, a brief petition, signed by Leandro Cardano, was addressed to the inspector of mines, asking a denouncement of a coal mine on the island of Raporapo, but no indorsement appears upon it and no action seems to have been taken. From a draft of a letter it is learned that Señor Cardano was the collector of taxes on tobacco for the province of Albay. This can scarce be considered a registry of a mine.

The work commenced in Batan was afterwards carried on by another proprietor, one Don Martin Varanda, and in the early part of this period the official tests were commenced on the part of the navy in the ships of war, and also in the stationary engines and the forges of the arsenals, blacksmith shops, tobacco factories, and other institutions under the control of the Government. It is curious to note that at the beginning of this epoch there were not lacking those who, from matters of personal interest, or from a pure habit of objecting to any-

thing that imported a change, raised objections even to a trial and much more to the purchase of an ounce of Philippine coal for use of the colonial government.

The Governor-General, on August 19, 1846, addressed a solemn communication to the inspector of mines, based upon one of these bugaboo claims of danger to shipping from spontaneous combustion. This was answered by the inspector, Señor Baranda, with like solemnity, and after calling attention to the fact that the coal has been transported from Batan to Manila in connection with cargoes of unhulled rice and hemp; that it has been stored for years in warehouses at Sorsogon and elsewhere, and had not caught fire from spontaneous combustion; he slyly calls his excellency's attention to the nature of these complaints and their glaring inconsistencies; since it is considered unserviceable by some because of its not burning and blazing, and by others because it burns and blazes too easily, being so liable to burn that its use is a menace to shipping from spontaneous combustion. He respectfully suggests that the conflicting and inconsistent reports of trial show that the trials have either not been directed with intelligence, or that perhaps the impartiality that is indispensable has not existed. Looking backward from the standpoint of the present day, it is not hard to discover several reasons that certainly influenced the officers and employees of the Spanish Government in their manifest opposition to the use of the Philippine coals.

The first of these reasons is found in the extravagant prices at which the Spanish navy were contracting their coal for this station in England. The price is so extravagant as to suggest that which the inspector of mines vaguely hints at in the official documents of this date, that a percentage of no mean amount was percolating from the coffers of the English coal dealers into the ready pockets of the purchasing agents of the Spanish navy. This suspicion is entitled to some consideration, since in that day the evidence of its existence was sufficient to found a hint of selfish interest in official reports.

There was also the conservative and old-fashioned official whose ease and comfort was ever disturbed by the idea of change. For years it had been the custom to buy coal from England; why disturb a custom that was so convenient and that would only add additional burdens to the officers of the navy serving on this distant station? Why change the long-established and convenient practice?

Then there was the further fact that the Spanish navy of that day went to England for its engineers and chief machinists, and the true Briton is clearly shown in the reports of George Peckham, the first engineer of the *Reyna de Castilla*, and John H. Hunt, the first engineer of the *Elcano*.

All of these reasons just stated were easily advanced and were officially sustained by reason of the shiftless and careless manner of

the mine owners themselves in procuring the coal that was used for making the tests. It was taken from the very surface of the ground; it was mixed with earthy impurities, and no attempt made to separate the coal from the dirt.

In place of care in mining, the selection of real and true veins or deposits, and an honest effort to obtain a practicable and suitable combustible, the mine owners wasted their time and their money in efforts to procure from the supreme Government a positive decree compelling the local navy to use Philippine coal and preventing the importation of English coal by the levying of prohibitive import duties.

Such a decree was obtained for the first, positive and imperative in form, but subject to the making of tests that should establish its practicability for steam-making purposes; while the latter became involved in a labyrinth of reports and counter reports, resulting in the eventual pigeonholing of the bulky and voluminous documents pro and con upon the subject of the prohibitive import duty. From time to time this hope was resurrected, and met with varied success, but it developed no mines.

This, however, was not altogether barren of results, for the owners of the Batan coal mines now commenced to do the thing that they should have done in the first place, and in 1849 we find them prospecting for better coal, and yet without the investment of that amount of capital which was positively necessary in order to secure even partial success. All sorts, kinds, and conditions of "black rocks that burn" were in the meantime being sent in to the Cavite Arsenal to be tested, under a sweeping order requiring such tests to be made, until November 1, 1850, when we find the commanding-general of the navy returning to Governor Urbiztondo a long expediente (collection of official correspondence) on the coal mines of Angat, in the province of Bulacan, and, forgetting the polite language of official correspondence, declaring in plain terms, "In addition to that which the expediente shows, it results from new trials that the mineral is not coal, nor, in fact, combustible of any kind, since a piece having been subjected to the action of a hot fire from one of the forges of the arsenal from early in the morning until late in the afternoon, it only resulted in turning it red and some lines from its surface was burned off; accompanying this is a small box which contains a piece of the rock for such uses as your excellency may deem suitable."

At this time (1847) the commanding-general of the Visayas sent in a report, with samples, touching the coal mines on the island of Siargao, in the province of Caraga; these were two in number, one located at Cacub and the other at Dapa; these mines were undeveloped; the supply was reported to be abundant. These deposits called forth from Señor Baranda, the inspector of mines, the fact that he had himself visited these same deposits in 1839, and that he had seen samples of

coal from that island of Siargao, which from its appearance seemed to be of better quality than the samples shown him.

In this document appears for the first time the complaint about labor, that in the later days became so prolific an excuse for the failure of every badly conceived, ill-directed, and worse-managed coal mining enterprise that scored an additional failure. The auditor of the Visayas calls the labor trouble to the attention of the governor-general in this language: "That among the various obstacles that exist for the prosperity of the province under my command, account should be taken of the lack of hands, the lack of affection for labor of our natives, and their inconstancy in carrying to completion the agreements they make and the enterprises they undertake."

A long memorial on southern Luzon and the newly discovered coal fields of Caramuan, in South Camarines, closes the official history of this period, and adds but one new discovery. This memorial, written by Señor Baranda, the inspector of mines, is both interesting and learned and very clearly marks the border line between this period of first steps in development and the next period, commencing with the year 1853, which may be properly named the dawn of the coal mining industry.

Ordered by the governor-general, in March, 1852, to visit the newly reported coal fields of Caramuan on the Pacific coast, May of that year finds the inspector at Nueva Caceres, and reporting that he is awaiting a guide, and complaining of the exposure "by reason of the danger of being captured by the Moros who for a greater part of the year remain along those coasts." August still finds the inspector at Nueva Caceres, where, in response to a sharp letter of inquiry from Manila, he asks a friend at court to appease the wrath of his lordship in case he shall inquire again, by a statement not only of the dangers from the Moros, but by reason of physical infirmities, the nature of one of which he broadly states in the words, "He who can sit down no more than half-way can much less ride horseback and travel over mountains." It seems that his lordship had promised the inspector a leave of absence of two months, and this he was waiting for in order that he might go to Albay for his vacation; and he winds up his plaintive letter to his friend in this regretful strain: "My friend, you are enjoying yourself in Manila with the latest comic opera, and I meanwhile am here, wearied with the infirmities of old age and unable to go to Albay, as I desire." The memory of his lordship, however, was not defective, and the inspector's excuses were not acceptable and he was called to account again, and this time he responds with a promise to move as soon as he can, and here for the first time appears the evidence of a proposition that was later to be advanced and insisted upon with force and in the next few years. This was that the State should buy the improvements of the coal miners and work the mines on its own

account. At this the inspector expresses astonishment and files a mild protest. In November, 1852, however, having completed his commission, he forwards a very long and minute report touching the entire section of southern Luzon and the coal field at Caramuan, which is up to this date by far the ablest and most valuable production in the archives of this department. The test of the samples of the coal at the Cavite arsenal and navy-yard was not satisfactory, for we find our old acquaintances, James Peckham and John H. Hunt, signing a certificate that the "said coal does not give sufficient heat in order to produce steam; and we are of the opinion that the aforesaid coal has been taken from the surface of the ground." This Caramuan deposit is known as the Hanopol field, it being located in the neighborhood of Mount Hanopol, which deposit figures later in the development of coal mines.

No records of located mines of coal appear in the archives of the inspectorate, although the filing of several claims, notably at Batan and Caramuan, are noted and referred to in the correspondence of this period. The closing of this period shows but two deposits of coal located for the purpose of being worked, namely, those of Caramuan and Batan, and neither of them were worked to such an extent as to be worthy of note as coal mines; they were rather speculative filings and depended upon the foundation of chance alone, and in no measure bear the indications of an attempt or desire for the establishment by private individuals of a bona fide mining enterprise. They seem to have been abandoned without reaching a permanent record. In the meantime prospectors and investors were passing over other portions of the islands and the way was being paved for the institution of bona fide enterprises, not only at Batan, but also in Cebu and elsewhere.

On May 3, 1851, by royal decree the governor-general was authorized to "farm out" convicts for the working of mines, the enterprise to pay a reasonable price for their labor, and also the wages of the guard, and requiring 8 per cent of the product to be paid to the State. This period, then, marks the introduction of "contract prison labor" in the Philippines, and became, with others later, a source of abuse that in no measure tended to establish the Spanish administration in the good will of the native population. The experiment of "contract prison labor" farmed out to outsiders proved an engine of abuse and oppression in the Philippines, as it has in all other countries where such a system has prevailed. In closing this chapter, I respectfully invite attention to the fact that from 1846 to 1853 the Spanish authorities had extended their power and control over a very limited section of the islands indeed; it was but a few miles from Yba, on the western coast of Luzon and toward the interior, when the region entered upon was solely in the control of the infidels and "lately submitted;" while in the south of Luzon, with the exception of three places at the most,

the natives held undisputed sway inland, and the Moros, following the occupation of pirates, dominated the coast during the larger part of the year. Mining had not become a feature in the history of the islands up to this date, and since that time we have many and numerous records showing the nature and extent of its progress and development which enables us to say with positive assurance and without fear of contradiction that these Philippine Islands have never yet been prospected and worked for minerals, and that to-day there is but comparatively little more of positive information as to the nature, extent, and value of the mineral deposits of this archipelago than there was in 1853. This will continue to remain so until the passage of such liberal laws as will enable the hardy miners and prospectors of the world to penetrate its jungle thicknesses and thoroughly prospect its mountains and hills.

While this Bureau is in possession of sufficient information to be assured that the mineral resources are considerable and probably great, it does not possess and can not learn its true nature, value, and extent without the aid and assistance of mines and miners, and these we can never have until we have not only laws, but liberal and encouraging laws that will furnish men with an inducement to face the dangers of the interior and sustain the expense of travel over roads which are, in the mining regions of the interior, little more in any case than narrow and tortuous trails. To these obstacles there is also added the richness of tropical vegetation, both obscuring the face of the country and increasing the hardships and risk of travel through it, and the expense of prospecting and mining.

CHAPTER IV.—THE DAWN OF THE COAL-MINING INDUSTRY, 1853-1860.

As indicated in the last chapter, the year 1853 marks the real beginning of the coal-mining industry, and it has its extension along the same line for a period of seven years.

This period has for its distinguishing feature the attempt, persisted in with great force and vigor, to force the State into a coal monopoly by putting the mine of Guila-Guila, in Cebu, in the hands of the State for development.

In this period commenced the development of the coal mines of Cebu; the first recorded analysis of the coal of the islands was made, and from here on the various periods, each of which have their distinguishing features, will be, as far as possible, divided into convenient chapters corresponding to these periods of development. Quotations from the documents found in the archives of the inspectorate, either literal or condensed, will constitute the larger part of the descriptive portion of the work.

This period opens with the location of a coal mine at Guila-Guila,

in Cebu, by Don Diego Viña & Co., on April 12, 1853, and with a decree of the superior Government, of July 13, 1853, later approved at Madrid, which withdrew the coal lands of Cebu entirely from location and concession, and this prohibition continued throughout this period.

There were but two concessions of record during this period, one in Cebu and the other in Albay; three concessions dated in November of 1859, which were located in Cebu, really belong to and will be classified with the next period.

These two concessions are as follows: Diego Viña & Co., at Guila-Guila, in Cebu, on April 12, 1853; Manuel Castro, at Casiguran, in Albay, on May 30, 1853.

MINES OF CEBU.

The particular time when Sr. Diego Viña, representing a company for the exploitation of the coal mines at Guila-Guila, commenced operations there is not disclosed. From a curious document in the archives of the inspector of mines, it appears that one Sr. Bautista de Marcaida had been interesting himself for a long time immediately prior to the location of the Guila-Guila mines, in a search for a mineral coal that would be profitable to the State and for private enterprises. In July, 1852, he submitted to the Governor-General a statement with reference to the discoveries that he had made, and the trials that had resulted from coals taken from several localities in the islands, and among these he includes those of Cebu, which form the title of this division. His documents will be considered later.

Viña & Co., on July 9, 1853, submitted a proposition to the treasury department of the insular government for the transfer of the mines of Guila-Guila to the Government.

His proposition, briefly stated, was in five sections:

First. That there should be paid to his company, at the time of formulating the contract of transfer, \$15,000 (pesos) to cover the cost of exploitation of the mines, the acquisition of contiguous lands, buildings, rails, animals, cost of railroad, and a sloop that had been provided for this trade; and in like manner the expenses to be contracted by the company from the date of the proposition until the closing of the contract.

Second. For the discovery, property and profits assured up to date, \$10,000 (pesos), and if the decision of the proposition shall be put off more than one year, \$20,000 (pesos).

Third. That two experts, arranged to come from Spain, should be employed by the Government in like capacity.

Fourth. The skilled superintendent, Pedro Cifuentes, is to be in like manner provided for.

Fifth. The company undertakes not to sell or to give options to

others until the decision of these propositions by the Superior Government.

The conditions of this proposition, and the selling prices proposed, strike the casual reader even having no further knowledge than that the mine was instituted in April of the same year, as being so out of joint with the best possible conditions, so extortionate, that it is a wonder that it obtained even the honor of a recognition in the office of the Governor-General. On the 15th of the same month, however, Governor Urbiztondo issued his decree directing the inspector of mines to send Mr. Antonio Hernandez, the assistant engineer, to Cebu at once, and in the meantime, reports having reached him of a discovery at Danao, that this also should receive attention. Two days prior to this, as will be remembered, Governor Urbiztondo had issued his decree withdrawing all coal lands of Cebu from location and entry with a view to government ownership and exploitation by the State. The instructions of Mr. Hernandez were framed in the office of the governor, and are as follows:

First. To embark for Cebu as soon as possible, presenting himself upon his arrival to the alcalde mayor of Cebu, who will furnish him the most active and efficient aid.

Second. To investigate first the deposit near Danao, reported by the alcalde mayor of Cebu on the 18th of December, 1852; to ascertain the quality of the combustible, its cost at the foot of the mine, its cost of transportation to the port at Carmen, and all the necessary information in order to place an estimate on coal obtained with hired laborers, with polistas, or with prisoners.

Third. If the deposits of Danao contain available mineral coal, to take out and send to Manila from 50 to 60 tons.

Fourth. Having completed his work at Danao, to proceed to Guila-Guila, where Viña & Co. were located; make similar investigations and reports, and a like shipment of coal.

Fifth. Make a valuation of the labors of the company up to date, the cost of contiguous lands, and a full report upon all the points of Viña's proposition.

Sixth. In case he shall receive notice of other deposits, to make a like examination and suitable reports.

Seventh. As soon as the work is completed, to submit a detailed memorial covering these points indicated.

On September 23, 1853, Sr. Hernandez presented his report. We shall divide it between Danao and Guila-Guila, treating first only of the latter and reserving the former for a separate subdivision of this same chapter, since the mines of Danao were destined to cut considerable figure in the future.

GUILA-GUILA.

At a distance of $4\frac{1}{2}$ miles toward the southwest of the city of Cebu, and on the highroad that leads to Naga, the river Mananga is encountered. This river enters into the sea near the town of Talisay and crosses a plain $1\frac{1}{2}$ miles in width. Here the river emerges from a canyon; the mountains gradually increasing in height as you advance toward the interior, the valley becomes closed in by high walls, and the fall increases greatly. Numerous arroyos enter the river from the right and left, and at a distance of approximately 9 miles from the crossing of the river, on the Cebu and Naga road, the assistant inspector found the mines of Viña & Co., known as the Guila-Guila mines. He found two shafts and four galleries. His exposition of the work done is here stated:

The shaft of the "Porvenir" is situated a few yards from an arroyo in which the water has exposed a discovery of a vein of coal; it is 14 feet long, 8 feet wide, and 12 feet deep; in one of the faces there is discovered a vein of coal 4 feet thick, which runs in the direction NNE. by SSW., with an inclination averaging 45° to the NNW., resting for a foot wall upon a bed of fine clay of grayish lead color, and with a roof of limestone of breccia formation and very hard, which is separated from the coal by a small vein of clayey sandstone.

The vein of coal, which on the bed of the arroyo appears clean and continues in the same manner for some feet, is encountered in the shaft at 12 feet in depth, and the whole of it is found with little veins of sandstone, which occupy very nearly one-half of its thickness. From this working the 40 tons of coal were taken out, which was tried in the steamer *Elcano* with satisfactory results. For that purpose the vein was followed from the bottom of the shaft for some 70 feet in the direction of length and from 17 to 22 feet in the sense of inclination.

At about 40 yards from the "Porvenir" the shaft of the "Santa Teresa" is encountered; an oval in form, with diameters of 13 and 11 feet and 20 feet deep. In this shaft there is presented one vein of coal of good quality, $4\frac{1}{2}$ to 6 feet thick, which runs from NE. to SW., with an inclination of 60° to the NW. In the foot wall of the vein a clay is presented, leaden in color, and for its roof it is covered by a clayey sandstone, which is traversed by veins of very hard breccia limestone.

Lower down from these two shafts, and on the same side of the road, there are three galleries. The first is 48 feet in length and $5\frac{1}{2}$ by $4\frac{1}{2}$ feet. This gallery is opened in the larger part in a bank of dark-gray clay, and at the bottom there is hard, gray limestone; it was not possible to mark the direction of the vein of this territory, because its appearance was very undulating and confused whenever encountered.

The second gallery, 400 yards from the first, is also opened in dark-colored gray clay, very broken; it is 64 feet long and the same dimensions as the first.

The third gallery, at about 150 yards from the second, is likewise found in the same class of clay, its length being 29 feet and its dimensions 6 by $5\frac{1}{2}$ feet.

The fourth gallery, named "Asuncion," about 1,000 yards from the third, is also opened on a broken and dark-colored bank of clay, which appears to alternate with a breccia limestone of gray color, appearing in the floor of the tunnel at a distance of 12 yards from its mouth; this also is found in clay, with small veins of white crystalline limestone. This gallery is 50 feet long, 6 feet high, and from 5 to 7 feet in width.

In the two shafts and four galleries it is estimated that 1,000 pesos may have been expended. The work done is scarcely worthy of being

called an investigation. A gallery of 200 yards or more should have been opened in a direction perpendicular to the stratification. Mr. Hernandez adds:

It is to be regretted that there has not been better skill displayed in the plan of these works, and that the excavation and timbering have been executed with such notable carelessness.

The lands and buildings belonging to Viña, and the acquirement of the contiguous lands which are mentioned in the proposition submitted, are next treated by Hernandez. Their enumeration is curious and interesting, and as an evidence of good faith in the offer upon which the exploiting of coal mines in Cebu was tied up with a prohibitive order for ten years it is deserving of mention.

	Pesos.
1 house, small yard, and 2 warehouses, bought of Esteban for	10.00
1 house, bought from Mr. Thomas.....	6.00
1 house and small tract, bought from Mr. Paul	14.00
1 small house, bought from Mr. Eugenio, with an indemnification because of the road crossing Mr. Eugenio's cornfield	12.00
1 house, bought for.....	15.00
1 warehouse, valued at	10.00
Some adjoining lands belonging to the hacienda of Santa Niño, of Cebu, a small annual tax paid.	

Making a total for the buildings and contiguous lands of 107.00

The railroad tracks, etc., seem to have escaped valuation, and from the evidence of the slipshod and slovenly working of these properties it may perhaps be fair to presume that after diligent search Hernandez failed to find them.

Mr. Hernandez disposes of the question of working these mines by polistas with the statement, so clear and evident, that they are not available because the working of the mines requires intelligence, which can only be had from men who are trained as miners and follow it as an occupation. As to the prisoners, their employment might be had upon the outside, but for the interior works, demanding both intelligence and vigilance, a higher class of labor was demanded in the interest of both economy and safety; that in his opinion the labors of the works, both inside and outside, should be awarded by contract.

The question of transportation from Guila-Guila we may dispose of in a few words. At that time there was 5 miles of heavy road where the river Mananga had to be crossed repeatedly, and it was not passable for carts or teams of any kind; and the 40 tons of coal procured by Hernandez was packed out on the backs of men and animals; and to make a road would necessitate many bridges and much grading and protection by embankments from rain washes and landslides. It is possible to secure the road, but with difficulty, and when secured the distance to Cebu would be shortened to $4\frac{1}{2}$ leagues, and the cost would be from \$1.50 to \$2 (pesos) per ton for transportation. The able engi-

neer aptly asks the question why they should depend upon the difficult and inaccessible mines of Guila-Guila, when much lower down and in many other places in Cebu there were deposits and outcroppings of coal, all of which promised equally well as those of Guila-Guila. The coal indications were found to extend throughout the whole extent of the river Mananga, and indications also were found 2 miles above Guila-Guila. "The coal area forms, apparently, the greatest part of the mountain range which runs through the center of the island of Cebu for nearly its whole length, and it is found very much overturned, as shown without doubt by the rocks of trap which ought to be present very plentifully, as the great number of round stones show, which stones belonging to this class are found not only in the river Mananga, but in nearly all the arroyos and canyons which I have had occasion to observe. There is an abundance between these irregularities of grit-stones, phonolites, clay stones, porphyry, and conglomerate of trap; vein marbles are likewise encountered in great quantity, commonly of grayish color. I have seen besides syenites, micaceous sandstones, and talcose slates. The sandstones, clays, and slates of the coal are hidden from sight under a marly limestone more modern, which extends the length of the island; it extends in many places to the coast and disappears in various others under the silt which forms the plain." Quotations from this report, touching the general formation, will not here be continued; they will be referred to in a later period, when a more careful geological examination has been made. It is only mentioned here, with its inaccuracies of little moment, as indicating that the deposits of Guila-Guila are in a formation apparently much broken, and that the mountains have been squeezed up, to use a common illustration, breaking and crumpling the formation of the geological periods and resulting in faults and slips in the formation, with a great variety of inclinations to the carboniferous veins. These things will be confirmed by later reports and more complete examinations.

So much at this point for the first formal report on the mine of Guila-Guila. Before passing to the consideration of the mines of Danao it may not be amiss to add at this point that the same engineer made another examination and report upon the mines of Guila-Guila, and that will be referred to in its order.

DANAO.

The town of Danao is situated on the eastern coast of Cebu, and at a distance of 16 miles, approximately, from the city of Cebu. This town is located on the seashore. The examination made by Mr. Hernandez, of course, was not very extended, and no mines had been opened. We learn from his examination, however, the general basis of the formation, and upon which extended mining operations were later carried on, and so for the present purposes this may be quickly

covered at this stage of this work. He first examined the deposit of the hill Masaba, in which two irregular veins were found in a clay of slight consistency; this is some three hours' distance from Danao and toward the northwest. Another vein in the same hill at a short distance was running apparently east and west, and with an inclination of 30° to the north. This vein was found in process of spontaneous combustion. Its quality is decidedly earthy and impure. Next, ascending the River Danao to its junction with the arroyo Lugupan, and at a distance of an hour and a half, the mountain of Bango is encountered, and here, upon the brow of this mountain, also coal veins are found burning. Going a short distance away a prospect gallery of a few feet encountered a vein of coal at 30° inclination toward the SSW., and with a course from ESE. to WNW.; for a roof this vein was covered with a yellowish-gray clay, undulating and very irregular, and for a foot wall a gray sandstone of a clear gray color. At the foot of this mountain, in the arroyo of Lugupan, a conglomerate clay deposit was found, in which a small vein of coal was encountered, but this formation, like the others, was also found to be very irregular and broken. Mr. Hernandez was of the opinion that this section should be examined with care, for in case a vein of good coal should be discovered, as was reasonable to suppose, its location for exploitation and transportation to a port of embarkation was all favorable. This region was not unlike, in its general geological characteristics and the manner of the deposits, the region of the Guila-Guila mines, and, in fact, a later examination developed that it is the same geological formation.

OTHER LOCATIONS IN CEBU.

Based upon accounts and personal examinations, coal was also reported in the district of Boljoon, and in those of Dalaguete and Argao; also in the termino of Naga. Of these Boljoon is nearly at the south end of the island of Cebu, Dalaguete and Argao in the middle southern portion and forming practically one district, and Naga is a distance of some 11 or 12 miles to the south of Cebu and is the district that is later known as the Uling-Lutac properties, and which forms the basis of the MacLeod concession.

These collectively comprise three separate geological formations in the Tertiary age, as will be later developed, and cover the entire coal area of the island of Cebu. Commencing at the northern limit of the belt, which is the largest in extent, the first district includes, in order from north to south:

Danao, on the river of that name, and its tributaries.

Guila-Guila, on the river Mananga, and its tributaries.

Uling and Lutac, on the river Pandan, and its tributaries.

The next, or middle district, includes:

Argao, on the river of that name, and its tributaries.

Dalaguete, on the river of that name, and its tributaries.

The extreme lower, or southern district, and the smallest of the three, is:

Boljoon, on the river Lamuño, and its tributaries.

DISPUTED HONORS IN CEBU.

Before leaving this subject of coal discoveries in Cebu, it were indeed a pity to pass over one of those interesting passages at arms touching the distribution of honors for coal discovery that are so common of occurrence in all mineral countries, and in the case of Señor Viña was not lacking in his Guila-Guila mine. When the report of Mr. Hernandez reached the inspectorate of mines, the Inspector Baranda added thereto a communication of great length, in which he adds the weight of his advice and counsel. It seems that Señor Baranda's infirmities, together with his unquestioned long and faithful service in the mining department of the Philippines, had gained for him an early recall to Spain, and he was daily expecting his release and orders to return home. He advises:

First. That as an encouragement to coal mining, the first contracts for the Navy shall be at \$20 (pesos) a ton instead of \$13 (pesos), the then price of the English coal, and so encourage the "infant industry," depending later upon its being diminished to a point that would make it cheaper than English coal, and even become a matter of export.

Second. That the inspectorate of mines be furnished with the necessary and indispensable means for making systematic investigations of the coal deposits of the archipelago and for making their reports public.

Third. That since there was an existing prejudice against the lignite coals of these islands and it was a well-known fact that in other countries, and particularly in the United States, both the lignites and the anthracites were being employed with the happiest results, he suggests that he be authorized to visit these coal workings of the United States on his way home and make an investigation of them for the uses to which their products are applied, reporting later thereon to the Supreme Government in Spain.

Señor Baranda then proceeds to pay his respects to the second proposition of Viña, namely, that for the discovery, property, and gains promised he should be paid 10,000 pesos. Figuratively speaking, the inspector proposes to "put a spoke in the wheel" of Viña's well-conceived plan to sell out to the Government, and, as later events show, he succeeded admirably, and, I venture to assert at this period of time, greatly to the benefit and advantage of the State, both present and prospective.

Señor Don Juan Bautista Marcaida, an intimate friend of the inspector,

seems to have been a man of some means, and with a commendable patriotism had been warmly seconding the heroic efforts of his friend the inspector in waking up the Government of Madrid to the importance of developing the coal industry of these islands. And let me say in passing that I do not jest in so speaking of the work of Señor Isidro Sainz de Baranda, the first inspector of mines of this archipelago. His work was done, and well done, and had he been allowed a fraction even of the aid and assistance that he reasonably asked for and should have had, his work would have redounded greatly to the credit of Spain, and its coal and other mines in the Philippines would have been established early in the fifties, and upon a permanent and paying basis. But, to return to the contest for honors:

The inspector says that his friend sought him for instructions as to the methods of acquiring titles to coal properties, and they talked extensively of the combustible and of the places in which—both in Cebu as well as many other points—the combustible was found, and the samples of the inspectorate were exhibited. Among these was a sample from Dalaguete. It would seem that the inspector and his friend were both favorably impressed with this latter sample, for, being presented with a small piece, straightway Marcaida hunted up Viña and others, and, associating himself with these men, a plan was formulated to visit this place. But the little memorandum of the name written by Baranda for his friend was small and indistinct, and so Viña was informed that the bonanza location was “Dumaguete,” instead of “Dalaguete.” It was only a letter or two, but it made much trouble. One of the partners—the expert mineral superintendent—was the same Cifuentes whose future was attempted to be provided for later in Viña’s proposition to sell to the State. Viña owned a sloop. The first place they visited was Semerara, in the province of Mindoro. This cost the partners \$150 (pesos), and the sloop of Viña was chartered for this voyage. A second voyage was made to Semerara, with Cifuentes in charge, and this cost \$400 (pesos). Viña’s sloop was still chartered. The second trip to Semerara brought encouraging results, but still it did not equal the little sample from “Dumaguete”—the little town on the island of Negros (not Cebu)—and once more the sloop was chartered for a trip to Semerara, where more coal was to be taken out, and then go on to Negros, where the “great bonanza” would be looked up at “Dumaguete.” For this voyage the sloop was to have \$120 (pesos) a month. The firm was Marcaida, Roces, Viña, and Cifuentes. Everything was prepared, and one morning Roces and Marcaida read in the shipping news of the morning paper that Viña’s sloop had sailed. Viña and Cifuentes had stolen a march on their associates, and Cifuentes was gone to sieze the find of Dumaguete. Alas, upon arrival in Negros they were astonished to learn that no coal deposit was known of there; that it must be a mistake; it might possibly be a

town of similar name in Cebu; that rumors of coal mines had reached Negros as being located at or near such town in Cebu. Nothing daunted, Cifuentes sailed for Cebu, and the discovery of Guila-Guila and the location of that mine succeeded. For this mine seems to have been found near a town of that name so nearly corresponding as to mislead Cifuentes a second time. They "rushed into print" over the honors, and the inspector backed his friend and exposed the attempt to defraud Marcaida of his honors, and Viña did not sell his mine to the Government.

CASIGURAN, ALBAY.

On the 30th day of May of this year (1853) an application was made to the inspectorate for a coal mine of three pertenencias, situated in the province of Albay, in the town of Casiguran.¹ This town is situated on the south side of the Bay of Sorsogon, and all that is known of this mine, which stands in the name of the peninsular Spaniard, Manuel Castro, a resident of the port of Sorsogon, is that shown by the official records, showing that on May 30, 1853, it was recommended to the governor for a concession, and by him approved on June 10, 1853, for three claims, but it seems that it was not issued. It was again solicited in 1861 by the same person, receiving the name of "Reyna de Castilla," and it will receive no further notice at this point, its further notice being left for the period of its reentry. Nothing outside of a bare reference to it in the official reports is known up to the end of this period.

ISLAND OF RAPU-RAPU, ALBAY.

Directly south of the island of Batan is the small island of Rapu-Rapu (Rapurrapu-Rapucapu), which is mentioned during this year (1853)² as having produced some coal which had been tested at the arsenal at Cavite with the usual bad results. The coal was not good. It is mentioned here because of its regular place in the list of discoveries.

ISLAND OF SEMERARA, MINDORO.

This island, lying directly to the south of the island of Mindoro and belonging to that jurisdiction, has been already referred to in connection with the visits made by Don Diego Viña and his partners during the year 1853, when some coal was brought away and tested on two separate occasions, with results not entirely satisfactory. The coal of this island will be found in later years, but its discovery properly belongs to the commencement of the period at present treated.

¹In the expediente in the archives of the mining bureau this is described as at a place called Caritan, district of the Visitation of Parina.

²This island and its coal deposit has a record of discovery and registration in 1847.

ANTIMONAN, TAYABAS.

To this period also belongs the first mention and discovery of the coal fields of Antimonan, on the Pacific side of Tayabas, and this field also will be spoken of later. In the reports of this period all of these places are barely mentioned. The question of the State entering into the coal-mining industry, of course, deterred private individuals from investing their money in the developing of coal mines, and in addition to that the entire capital of the business men of that day was finding more profitable employment in other speculations; and under all the circumstances existing it is doubtful if coal mining would have gained much headway even if it had not been for the proposed exploitation by the State.

The report of Antonio Hernandez, with all the accompanying documents, including the propositions of Viña, were sent to Madrid for the consideration of the supreme Government, and thus the year 1853 was closed. From that period on until 1860 a few new discoveries are reported, and the intervening period discloses many reports on the propositions considered, and these reports will now be reviewed in order of their dates, the new discoveries being noted in their order to complete the history of the period.

CLOSING REPORT OF INSPECTOR BARANDA.

[March, 1854.]

Before taking his departure for Spain the estimable and worthy inspector, Don Isidro Sainz de Baranda, whose industry and zeal is unquestioned, prepared and left in the archives of the inspectorate a lengthy memorial on the coal deposits of this island, which we shall now review, taking therefrom such extracts as, in our opinion, may prove useful, either historically, scientifically, or industrially.

Its opening paragraph is wisely chosen: "Nature, wise in her laws, has not distributed her products equally in all climates and countries; but where she is lavish with some, with others she has made a scarcity. This cause, so simple, is the principal basis for a community of interests of all countries, and gives rise to commerce and encourages industry. By carrying products from one place to another information is carried at the same time, civilization is extended, and fraternity of the countries as between themselves. All are tributary points, one to the other, and to think that all that is a necessity in a country is to be found in it is not to know the truth, is to demand an impossibility, and to be so recorded on this is not to know one's real interests."

In the list of places where coal has been discovered, in addition to those that are already recorded, he mentions:

Island of Bohol, in the town of Hagna.

Island of Mindanao; Marihatag and Tobo; Bislig, Dapnana, Baganga,

Mamistagao, from Agman to Calatagan, and between the river Agusan and the Gulf of Davao.

Islands of Mariannas; at Agat, in the island of Guam.

Referring to the causes urged against the use of the coals of these islands, he mentions only two as worthy of consideration, the quality and the price. As to the first, he says "The geological construction of the islands being kept in mind, the existence of a deposit of coal ought to be hoped for, of a quality, abundance, and conditions as superior as those Europe possess." As to the second, "It ought to be considered that the means of exploitation are expensive, the carriage to a point of embarkation is equally so, and the freight in this country is high."

We name these without comment. He very pertinently says that it is unfair to judge these coals by tests made, because they have all been taken from the surface of the ground. He complains bitterly of the refusals to make extensive tests of the coals, and again reviews at length the various fields examined by him, and the tests that were made, with their results, in the main unfavorable, but in a few instances, notably from Batan and Cebu, with satisfactory results. Referring to the exploitation of coal by the state or by individuals alone, he pertinently remarks, "In other times it was thought suitable for a government to be a proprietor in the industrial and manufacturing world, by which the arts are to be encouraged and the establishments of the state serve for a model. But long since experience has demonstrated that with the government as a proprietor it results in higher prices, and the encouragement that the arts receive is nothing. So it is thought that only in exceptional cases is it desirable to depart from the general regulation."

After thrashing over again the objections to the use of polistas, forced labor, and prisoners, he emphasizes the fact that only free and well-paid labor, producing trained miners, can succeed, and especially in new industries such as the coal industry, and as an illustration he quotes:

The 150,000 picos of abaca which leaves annually from the province of Albay are all produced by free hands, and it is very probable that it would not be possible for the government to produce with forced operatives as much nor of as good quality.

He suggests, also, that—

State exploitation will result in one depositary at the capital only, and that individual speculation will be entirely lacking by which we might expect not one, but many, convenient depositaries, both for the Navy and the merchant marine, and above all, that new and better discoveries will be made, while with state exploitation but little attention will be paid to the finding of new and better deposits. And, lastly, from the Government procuring the combustible mineral that it needs for itself, it is sure that, there being a lack to individuals of the opportunity of providing the Government steamships with coal, no one would dedicate himself to the coal-mining industry, and the infant industry will be suffocated before its birth.

He suggests, rather, that individual speculation be stimulated, offering premiums on the first hundred tons of good coal; by taking the

first thousand tons from each mine that is serviceable at a price equal to or even above the English coal; by establishing sundry public coal depots for the Navy and merchant marine in different parts of the Archipelago, and, "in addition to all these measures, the importation of foreign coal, as much as the mines of the country produce, ought to be hindered and made difficult by imposing on it an import duty."

He urges the Navy to discard the old machinery and adopt the new and more powerful machinery that increases the space for coal bunkers and freight and decreases the space occupied for machinery, and then the coals of these islands can be used for all voyages within the Archipelago, and, mixed with English coal, even in longer voyages. He again urges the desirability of some engineer being sent to the United States, where the lignite coals are certainly employed, and make reports to Madrid "about the class of combustible that is there employed, method of doing it, and other things that he may judge of interest."

This paper, much more full and complete in details than our abstract shows, went to Madrid with the other papers of the year before, and doubtless had much influence, as it deserved, in the decision that was eventually rendered, and resulted in the total rejection of the proposition to buy the Guila-Guila mines.

Having spent many months of careful study and examination of the records and archives of the inspectorate of mines, which never did receive that support, either from the supreme or the insular government, that it deserved or the ability and merits of its inspectors demanded, I close the review of this final work of Inspector Baranda with regret. I know nothing of him except that which is shown in the records; he came here filled with enthusiasm and patriotism; strong and robust, in 1838-39; he commenced his work; for several years he seems to have been engaged in traveling about through wild and dangerous and fever-laden localities, for some time, at least, literally carrying the inspectorate office in his hat, and in 1854 he goes back, after sixteen years of faithful service, broken and shattered in health and filled with bodily infirmities that seemed to weigh upon him far less than the infirmities of the mind that resulted from an apparently unappreciative government; and yet his last, like his first, paper breathes a spirit of intense loyalty and unfailing interest and hope for the mining industry of Spain and the Philippines. I would gladly know more of one who so honored his country and in like degree, yet with becoming modesty, honored himself.

THE GUILA-GUILA MINES AGAIN.

[July 4, 1854.]

The day was celebrated in Manila by the issuance of an order by the Marquis of Novellches, who succeeds Urbiztondo as governor, to

Antonio Hernandez, temporarily in charge of the inspectorate of mines, in place of Señor Baranda, to again proceed to Cebu and sketch the Guila-Guila mines, look up and examine and map a road from the mine to the coast, and estimate its cost, and also submit estimates for coal bunkers, one to be made at the foot of the mines, and the other on the shore; and also an estimate of all the tools, etc., that would be required for carrying on the work of exploitation. Madrid had not yet been heard from, but there seemed to be abiding confidence in the office of the governor and captain-general that Viña's propositions, or at least some modification of them, would be accepted, and that the state would enter upon the work of exploiting the coal mines of Cebu. This report was a very long one, accompanied by elaborate maps and plans for the road, but it is only necessary here to present the principal figures submitted. The canyon of the river Mananga was selected as the most practicable route for the road, and the cove of Tanquey, near the town of Talisay, as the terminus on the coast, where a mole could be built and ships have good anchorage.

The whole distance of this road he estimated at 21,200 yards, and with grades as follows: 2,300 yards, with a grade of 3 yards to the 1,000; 4,700 yards, at 5 yards to the 1,000; 1,500 yards, at 10 yards to the 1,000; 6,000 yards, at 12, 10, and 8 yards to the 1,000; 1,400 yards at a 2 per cent grade; 900 yards at a 4 per cent grade; 2,800 yards at one-half of 1 per cent grade; 1,600 yards horizontal, or practically so. On this road something more than 40 bridges, great and small, would be required, that would cost 20,000 pesos. For its construction he divided the road as follows: 7,600 yards to be done with polistas, requiring one and one-half years; 9,900 yards to be done with prisoners, requiring 500 prisoners for one and one-half years; leaving 900 yards over roads already established or requiring no work, and 2,800 yards to be constructed by the mining enterprise, presumably to be taken out of the purchase price in case the sale should be consummated, or possibly to be paid for by the State under that provision of Viña's proposal which provides for reimbursing the company for moneys expended in development, etc., pending the consideration of the purchase proposition. He recommends the bridge work to be done by contract. With these conditions the coal transported to the coast with carabaos is estimated at 1 peso per ton. The cost of bunkers is estimated at 1 peso per ton of capacity. He says nothing about the estimate of tools required.

He closes his report with the words, no less true to-day than they were in 1854, "The most effective preparation that the Philippine government can exercise and dispense to the enterprises that are dedicated to the exploitation of coal (and other) mines is the construction of roads in order to convey it to the coast; without these it will amount to nothing that the coal is found and mined in abundance."

THE VIÑA SALE FALLS THROUGH.

[July 10, 1855.]

In the meantime the samples of coal from Cebu and the expedientes of 1853 and 1854 had reached Madrid, and the coal was analyzed by the school of mines, and the mining junta on the 10th of July, 1855, issued its decision. It is very lengthy and recites a great deal of the reports already quoted from, and then proceeds to disapprove of the scheme for State exploitation, as follows:

Bearing in mind all the favorable circumstances and the good quality of said combustible, this junta does not hesitate in considering the carboniferous territory of Cebu of the highest importance to the security and prosperity of our Philippine Islands, being at this point entirely in accord with the interesting report of the captain-general, Mr. Antonio Urbiztondo; not so in the idea that the Government purchase the mines of Mr. Diego Viña and establish on account of the State the exploitation of coal, because even though this in certain cases might be suitable, economical, and even necessary, this is not so in general, and it will be easy to understand what is always required by industrial enterprises, which is generally admitted, ought in the beginning to be left to the speculation of individuals who, with an administration more expeditious and more simple, can produce it much cheaper. So in this view, as well also that the price asked by Viña is very excessive, the junta thinks the incipient mines of Guila-Guila, upon the river Mananga, of Cebu, ought not to be purchased on account of the State, mines whose labors and expenses up to the end of 1853 were still very insignificant, and could have produced coal enough to indemnify the owners, especially when the discovery is more due to the diligence of the inspector of mines than to the forcefulness of the concessionary.

The junta recommends that the navy be required to allow the Philippine coals to intervene, and that preference be given them for the present, in contracts with English coal, even if it does cost as much; that depositories be established and every possible encouragement given the industry, since "the coals already discovered are of enough importance to merit our preferred attention, because they are at least as good as many of the coals of Europe and North America, where all classes of combustibles are made available." The junta, however, disapproves the recommendation of a duty on the importation of coal to the Philippines. In due time the Queen approved, and therefrom resulted the royal order of January 30, 1856, here quoted:

ROYAL ORDER, JANUARY 30, 1856.

Let it be recommended by your excellency, very efficaciously, the suitability of protecting by such means as may be in your power the exploitation of the coal mines, making the points of deposit easy of access for the benefit of the enterprises, and conveniently located for the use of steamships; intervening in the contracts that the national navy may make for the supply of combustible in the department; arranging that the contracts be subdivided in such manner that infant industries may be able to take part in them, giving preference and protecting such enterprises under equal circumstances over those presenting coal from elsewhere, even though in the first years the coal of these islands may cost the State as much as foreign coals.

On April 26, 1856, Governor Manuel Crespo transmits a copy of this royal order to the inspector of mines and makes this curious question:

That it may please you to show me how much it may offer and how much it may conform to the end of obtaining the resulting advantages that the Government of Her Majesty proposes in the development of the important branch of mining in these islands, and principally of coal mining, for which industry I will attempt to overcome the difficulties that present themselves in so far as this is within my ability.

At this date, and looking back over the intervening years, this seems like a despairing cry of "Help!" and a careful perusal of the royal order easily supplies the explanation of his distress, since it says nothing and promises less, measured at least by the air-castle picture of State exploitation that had been builded up with such care and with such promises of emoluments and wealth (to the State?).

ANALYSIS OF CEBU COAL BY THE SCHOOL OF MINES.

[At Madrid, July 10, 1855.]

The following is the statement of the result of the analysis of the coal of Guila-Guila at Madrid, and referred to by the mining junta:

QUALIFICATIVE NOTE OF THE COAL OF CEBU.

The samples coming from Guila-Guila, on the river Mananga, at 3 leagues from the port of Cebu, burn easily, with a very prolonged, brilliant flame; they do not contain pyrites in a notable or prejudicial quantity, and all form a dull and black coke, a little spongy and of some weight.

From the numerous tests and analyses made in the laboratory of the School of Mines it is deduced that the bank of coal, 4 feet thick, from which they come may be subdivided industrially into three sections or subbanks, of which—

The best has a specific gravity of 1.14, leaves 6 per cent of ash, gives 60 per cent of coke, losing 40 per cent of volatile matter, and developing 5,750 calories.

The second quality: Specific gravity, 1.10 to 1.22; ash, 11 per cent; coke, 58 per cent; volatile matter, 42 per cent; calories, 4,860.

The third quality: Specific gravity, 1.30 to 1.46; ash, 18 per cent; coke, 56 per cent; volatile matter, 44 per cent; calories, 4,200.

The good coal of Europe and North America for general metallurgical use and for steamships and locomotives: Specific gravity, 1.15 to 1.50; ash, 2 to 14 per cent; coke, 55 to 70 per cent; calories, from 4,000 to 7,200.

It results, then, that the coal of Mananga, in the island, in conjunction with these, is very well suited for the use of steamships and general metallurgical and industrial uses, and that for steamers of long voyage preference is given to the first quality of said coal, whose specific gravity is the most normal, its ashes do not pass 6 per cent, and its caloric power exceeds 5,700.

MADRID, July 10, 1855.

A true copy.

JUAN A. MARTINEZ, *Brigadier Secretary.*

SIBUGUEY COAL—MINDANAO.

[December, 1855.]

In the meantime, and while the State exploitation scheme was reaching its decision and quietus in Madrid, word was brought of the existence of rich coal fields in the southern part of Mindanao, in the mountain of Marasingan. This requires only the briefest notice. Señor Cordova, of the department of engineers at Zamboanga, organized a party and visited this section with a large force of prisoners, and, leaving Zamboanga on November 18, 1855, they visited this mountain and returned to Zamboanga on the 18th of the following month, bringing a few tons of coal procured after a long and tiresome overland journey and with great difficulty, because of its scarcity, and reporting the entire proposition as an apparently impossible one. This report was referred to the inspector of mines, who ground out another long rehash of his former reports, after the fashion of that day, and repeated the result of the test which had been made on the steamship *Magallanes* with the coal secured by Engineer Cordova, and recapitulates as follows:

First. That the coal of Sibuguey is of inferior quality to that of Cebu and Caramnan, since the trials made in the steam war ships disclose that for each 9 quintals of Wales coal of good quality (Cardiff) or 12 quintals of Newcastle coal of medium quality there are required 13 quintals of coal from Cebu, 16 quintals of coal from Caramuan, and 24 quintals of coal from Sibuguey.

Second. That the coal discovered in the Marasingan Mountain, in Sibuguey, is far from being as abundant as the deposit of Guila-Guila, in Cebu, and even as that of Hanopol, in Caramuan.

Third. That the situation of the said deposit of Marasingan, as regards the coast, is much less advantageous than that of the deposits of Guila-Guila and Hanopol.

THE QUESTION OF THE GOVERNOR ANSWERED.

[May 20, 1856.]

On the latter date Inspector Hernandez answers the query of the governor general as to the means to be employed to carry out the beneficent intentions of the royal order of January 30, 1856.

The answer is long, and only a few lines of it are of present interest. He narrows the favorable coal discoveries down to Cebu, and adds: "Unfortunately, the decree of the most excellent governor and captain-general, Mr. Antonio de Urbiztondo, of July 13, 1853, has hindered the making of exploitations and the establishing of works, and there exists only those which prior thereto had been undertaken at the site of Guila-Guila, in the canyon of Mananga—works that are yet far distant from being those which the conditions of the deposit permit.

To-day, Her Majesty having declared her will that the coal mines of this archipelago may not be worked on the State's account, the prohibition has no object, and the time has already arrived for revoking said disposition (decree), which has only a provisional character and impedes the individuals who would dedicate themselves to this interesting branch of industry, being satisfied of the importance, and whose necessity is becoming known."

He also recommends that the Government of Her Majesty be advised of the propriety "that it detail an engineer of mines to verify a detailed geological examination of the island of Cebu, furnishing him to that end all the resources that a work of this class demands;" that while the Government has declined to conduct exploitation on its own account, still, "whenever the Government can take charge of the study of the territory and can take an interest in showing the possibility of undertaking reasonable speculations, capitalists will not be lacking, perhaps it may be in the peninsula or in foreign lands, who will dedicate themselves to this branch and some day liberate us from the necessity of employing English coal, carrying the production in the island of Cebu to the point to which it is called by nature," and, finally, "the construction of roads is the most effective protection that can be given to the coal enterprises, and without these it will be difficult, or even impossible, to secure good results." He urges again that the Government at once be urged to interest itself in the construction of roads as a duty it owes not only to the people, but also to itself.

A FINAL ECHO FROM CARAMUAN.

[1853-1860.]

We should not close the chapter on "State exploitation" without a reference to a document that forcibly illustrates the tedious delays and inexcusable neglect to expedite business between the mother country and its Philippine colony. The reader will recall the report of Inspector Baranda of 1852 on the coal fields of southern Luzon, and especially of the deposit of Caramuan, and which has been referred to herein with approval as an able paper. It was sent to Madrid and referred to the mining junta, and in November, 1853, the junta returned it to the minister of colonies, with a request that samples of the coal of Caramuan and of the geological formation of southern Luzon be asked for from Manila, and that the paper then be returned to the junta, and urged that it be done with speed, as the subject seemed to be of great importance. As an evidence of the feverish haste of the colonial department, it was April 3, 1860, or nearly seven years later, when this paper was taken up and the necessary order issued by the minister of colonies for procuring the material and information requested by the mining junta.

REVOKING THE ORDER OF PROHIBITION OF COAL CONCESSION IN CEBU,
APRIL 3, 1860.

On this date, also, the royal order was issued approving the order of the governor and captain-general of the Philippines revoking the order by which the acceptance of coal-mining concessions in Cebu was prohibited, pending the decision of the question of state exploitation. This action of the governor-general bears date of November 3, 1859, and was issued by him upon the petition of the firm of Diego Viña & Co.

CHAPTER V.—THE BEGINNING OF FIXED RECORDS.

Up to the year 1860, as has been said in a semijocular manner, the general inspector of mines seems to have carried the records and archives of his department in his hat. Mr. José M. Santos, being placed in charge of the scattered expedientes and memoranda constituting the records and archives, undertook to consolidate and form a permanent record of the various attempts that had been made to make entries and procure titles to coal and other mines by denouncement proceedings under the code of 1846, as well as by the special permissions of the Crown, so far as they were of any force or validity, and for this purpose he commenced the book of registries known as Book 1 of the Registry of Expedientes of Mines, which is now in this bureau and known as Volume VI in the subsequent arrangement of the archives. This book bears the certificate of Inspector Santos in its commencement, over a certificate explaining its objects and purposes, as above indicated, and that certificate was dated August 1, 1860. Thereafter memoranda of the various procedures were entered therein, and finally the book was closed, and the next volume commences with the adoption of the code of 1867.

This book, like those under the new code, was but a collection of memoranda, not many of the original documents being entered in full, and not even copies of the titles that were issued, saving only the maps or plans of the surveyed mines, and the extended and completed field notes of such surveys. It furnishes a criticism upon the method of keeping the mining records which should be avoided in the future.

For instance, under the code of 1867, when once an expediente was completed, and the title to a mine had been perfected, the expediente containing all the records of the various steps in the procedure, and upon which the title was based, and the examination of which would become so material in the settlement of disputes that might arise touching boundaries, conflicting claims, and many other questions, was sent back to the office of the governor of the province where the mine was located, and no complete copies remain in the permanent archives of the central government.

Unfortunately these governmental archives in the provinces have been largely burned and lost through insurrection, and valuable information, from many standpoints, has been lost forever. While it is true that the most of these documents are valuable only from an historical standpoint, governments should not be careless of the preservation of all matters of its procedure, by which the historian may, years after the makers of history have been gathered to their fathers, write out for future generations a fair and impartial statement of the general trend of the country's advancement, civilization, and progress.

The archives and records of the mining bureau, in Manila, have not been so destroyed, but it is a matter of regret that they are not full and complete copies instead of mere memoranda and incomplete notes. I have recommended in my reports, and beg to repeat it here, that whatever system may be adopted for the record of mines the final resting place of all original documents and papers relating thereto should be in the office of the central administration, at the capital city of the country. If it shall be requisite for local service and convenience that there be provincial records, then let all such documents be transmitted in duplicate, whereby there is a double precaution against destruction of the entire material by which titles and rights of possession are established, and upon which history is founded.

In the two chapters following, the first devoted to Cebu, and the second to Tayabas and all other localities of the islands, and covering the period from 1859 to 1870, we should be at much loss to get even as complete a view of the progress and development of the coal industry as we have, had it not been for the care and forethoughtedness of Señor Santos in opening even these imperfect and incomplete books of registry.

As a guide to the period treated of in the two chapters following, a table has been prepared in which all of the coal entries and filings upon alleged coal discoveries in the Philippines are set forth in chronological order, showing the date of entry, name of mine, locality where discovery was made and the proposed mine was located, the district and province, together with the number of claims, superficial surface in square varas, the name of the entryman, and date of demarcation, together with the date of cancellation, wherever the same is distinctly and with certainty noted in the records of the mining bureau.

It will be observed that very few of these mines were actually surveyed, although the number of entries during the period treated of, namely, from 1859 to 1870, amounted to 87 different and distinct claims, all located in the provinces of Cebu and Tayabas, with the exception of the "Reyna de Castilla," in the province of Albay, and the "Mina del Sol," in the province of Abra.

For the preparation of this table a very careful examination has been made of all the records and archives, for the purpose of correct-

ing errors in names, dates, and places, so far as possible. By reason of the lack of system and regularity in the keeping of the records under the Code of 1846, the accomplishment of this purpose has been very difficult, and, notwithstanding our best efforts, it is probable that some errors may have crept in, especially in reference to the exact locality of the discovery and the date or dates of cancellation.

All of the mineral entries embraced in this table are recognized as canceled entries, and a general notation to that effect is found in the record, but in the preparation of this table we have only inserted the date of cancellation where a specific record of cancellation in the regular course of the procedure was clearly and distinctly noted thereon and at the proper time. This table is marked Table I.

CHAPTER VI.—MONOPOLY PERIOD IN CEBU, 1859 TO 1870.

During this period, commencing with November 7, 1859, and continuing for several years, a curious attempt seems to have been made to create a monopoly in the coal trade of the archipelago by means of the control, by practically one firm, of the entire output of coal from the island of Cebu, and for this purpose petitioning for all the reputed and known deposits of the island.

The members of the firm of Viña, Rojas & Co. were the ones who attempted this monopoly, and for this purpose they divided into two sections, Rojas & Co. taking the mines of Uling, and Viña taking those of Alpaco. There were really three fields in the same neighborhood where these operations were carried on, namely, Uling, Lutac, and Alpaco.

Speculative entries were made from time to time, many of them being allowed to lapse, and then were renewed again from time to time at various other points in the island. Arranged in the order of their importance, the following tables show the number and character of these filings:

First. The Uling coal fields, towns of Naga and Minglanilla.

Second. The Alpaco coal fields, town of San Fernando.

Third. The Lutac coal fields, town of Naga, River Pandan.

Fourth. The Danao coal fields, town of Danao. Divided into three groups, according to location, viz, the Mount Licos, Legaspi, and Magallanes groups.

Fifth. The Jinolauan coal fields (now Toledo).

Sixth. Miscellaneous coal fields, towns of Carcar, Boljoon, Mambaje, Dalaguete, Balete, Argao, Sibonga, Badian, and Alegria.

(See Table I.)

The first three of these only were worked during this period, the rest being purely speculative entries, made upon every new or reported discovery, and never carried to the point of a survey, and for which only 10 meters of prospecting work was required upon each mine; but even this was not done in the majority of cases.

These mines consisted of three claims each, under the code of 1846, and were supposed to cover a superficial surface of 180,000 square varas for each claim.

These three groups are of especial interest, since they are all in the valley of the river Pandan and its tributaries, which territory forms the basis of the great Macleod coal concession, which forms a separate chapter in the latter portion of this report and which is now under consideration by the United States military government upon application for the perfection of a title.

During this period it will be remembered the King had instructed the captain-general to extend every possible aid to the development of the coal-mining industry, the State having just declined to enter upon the work of exploitation of coal mines on its own account by its refusal to purchase the mines of Guila-Guila, as related in the fourth chapter.

Very little, however, exists in the archives of the mining bureau bearing upon this period, outside of the expedientes of the many filings, and the seven surveyed mines which resulted. Señor Abella, in his geological work on Cebu, gives a brief summary of the workings of this period, and to that we are indebted for everything that is known of any considerable value relating to these mines. From it we quote:

Mines of Naga.—Work was done in four places of the jurisdiction of this town. Insignificant in Sibod, at the Rosario mine, and in Lutac, at the Santo Niño mine; considerable more were those of the San Antonio and San José mines in Alpaco, and much more important and intelligent in the mines of Uling, the Santo Domingo, Nuestra Señora del Carmen, and Purísima Concepción, afterwards included in a group under the last above-stated name.

Mine of Sibod.—As we were hardly able to notice any traces of the mouth of the fallen gallery in the work on Sibod Creek, hidden among the close foliage of those places, we appeal to the Book of Demarcations of the Inspectorate, which describes the deposit, and we find that it consists of a layer of coal with a mean thickness of 70 centimeters, running almost from N. to S., with an inclination of 30° to the E.

Mine of Lutac.—Mr. Lasaña gives us some information of the mine of Lutac in a report to the superior civil government, written in 1861: "It has," he said in it, "one layer of coal whose thickness varies between 70 centimeters and 1.50 meters; its direction is approximately from NE. to SW., and its inclination to the SE. It is placed between a clayey schist, serving as a bed, and a layer of clay that forms the roof. The workings consist of three galleries at different levels, of which the two upper ones have cut the layer of coal at a distance of 50 and 54 meters, and the lower one has not yet cut the deposit at all. The coal is not coherent, and the greatest part of it comes from the mine entirely pulverized."

Mr. Centeno, who saw these works sometime after the mines were abandoned, assigns to the layer (in his Geological Memorandum of the Philippines) a thickness of one meter, and inclined toward the NNW., connecting it with those of Sibod and Santa Rosa, in Danao, and declaring, besides, that its coal produced a coke of excellent quality, proved in the arsenal of Cavite.

When we visited this place, besides the three downfalls we found only a remainder of a gallery, opened in a direction from E. to W., upon a conglomerate, and two or three outcroppings, only one of which showed with clearness, in a very much over-

turned ground, a thickness of 80 centimeters in the layer, and a stratification sensibly extended from N. to S., with an inclination towards the W. According to creditable information that we have acquired the works of both mines were abandoned on account of the irregularity of the layers, and on account of the coal being so brittle that it was unable to stand transportation.

Mines of Alpaco.—Of the concessions of Alpaco we have still less facts than of the former ones. Mr. Lasafia, in the same report to which we have just referred, says: "The works are also of little importance, the opened galleries not following the layer over 20 meters in length. The thickness of this layer is from 1.50 meters up to 2 meters; its inclination is 40° to the ENE. It is located on the brow of the mountain, and by reason of its elevated position has very little ground for exploitation under the water level."

Mr. Centeno, in spite of having visited it, indicates nothing specially about these layers, and we are only able to discover with difficulty several old fragments, already almost covered with vegetation, and only one outcropping disclosed by the waters of a creek, probably after those mines were abandoned, for otherwise they would have taken out all the profitable coal, as they did in other places in the valley. That outcropping showed a direction of NW. to SE. and an inclination of 50° to the SW. We know also from private accounts that in order to take out the greatest amount of coal in any possible way they made inclined galleries after the manner of "Las trancadas de Almeria," in which the drainage was very soon made impossible with the scarce means at their disposal, compelling their abandonment. This enterprise, as we see it from a mining point of view, was of very little importance; nevertheless, they knew how to acquire for their own benefit all the sympathy and official protection which was conceded to mines.

Mines of Uling.—In Uling, as we have repeatedly said, the most important mining of all the island was performed, and, though we were unable to penetrate into them, because all of them were completely demolished, we saw and studied some of the outcroppings that are around them, and were able to connect them with the works that existed by consulting the plan we found in the archives of the "inspectorate."

We shall not go further into the description of the works at Mount Uling, since these will be made the subject of a special chapter later in connection with the MacLeod coal concession. It need only be added here that the coal mines of Uling were worked to a greater extent in this period than any of the others in the island, but still not to such an extent as to develop the worth and value of these deposits.

A CURIOUS FACT AND ITS CONSEQUENCES.

In his work above quoted, Señor Abella thus refers to the action of the superior civil government, following the failure of the sale to the State of the Guila-Guila mines:

As a curious fact we must point out that, although the Supreme Government, advised by the superior mining junta, had already refused the idea of exploiting the coal mines of Cebu for the account of the State, the superior government of the archipelago, doubtless in love with its design, though not with the funds of the State, still making free with the funds of the province, attempted an exploitation, strange, indeed, directing the governor of Cebu to denounce the best deposits of his territory and to prepare afterwards the most appropriate way to exploit them. Fortunately this order was not accomplished, or there were presented other difficulties which made it impossible of realization.

This language is brief and decidedly pointed, and casts a flood of light upon the sentiments prevailing regarding the value of the coal deposits of Cebu—an opinion by no means founded either upon rhyme or reason. So great and unfounded was this enthusiasm, that the same superior government of the islands, anticipating the sale of the Guila-Guila mines to the State, had expended much time and labor in building a road to the Guila-Guila mines. and to which Abella refers in this language:

The projected purchase of the Guila-Guila mines, and the unfortunate idea of the exploitation on account of the State, having been rejected by the Government of Spain, and having tested the coals of that concession with favorable results in some of the steamers recently arrived at the islands, the building of a road from Guila-Guila to the shore was commenced before they had perfectly examined the deposit and calculated the disposable field of workings, and so learned the production that might be expected—the Government contributing with 200 prisoners, the province with 12,000 polistas, and four or five thousand pesos for materials, and Mr. Hernandez offered himself, with the greatest disinterestedness, for the execution of the work as projected. But in the meantime the workings of the mines, which had been irregularly commenced by the proprietors, and which were afterwards put in order and continued under the well-directed advices of Mr. Hernandez, gave their result, establishing, says Mr. Lasaña—from whom we take these accounts—enormous breaks in the deposits, and almost complete disappearance of the combustible; a sad ending for an enterprise that had spent 70,000 to 80,000 pesos in their works, and who shall always have the merit of being the first in furnishing the means to establish such a profitable industry in the country.

The same authority thus clearly states the course and result of the work of the period following the abandonment of the Guila-Guila enterprise:

In spite of the failure of the Guila-Guila, the members of the exploitation association of Viña, Rojas & Co. did not become discouraged. This association dissolved, and in 1859 the firm of Rojas & Co., on the one part, and Viña, on the other, took advantage of the raising of the order prohibiting the registration of mines in the island, the first mentioned establishing themselves at Uling, and the second at Alpaco, beginning the new works with enthusiasm. There was entered throughout the island, for the account of both mines, as is always the case, a multitude of mines which were not worked because, probably, they were made with only the object of monopolizing all the lands containing coal on the chance of a favorable result that the mines of Uling and Alpaco might produce; so it is, that they renounced these, or allowed the time to expire, in order to register, several times, as may be seen in the statements of concessions petitioned for in the island.

In April, 1861, the commanding general of the arsenal passed by Cebu, and being informed of the existence of these mines, he ordered that the coals be tried in a gun-boat. These trials were again repeated with success in other vessels of more power, and the owners of the mines, encouraged, started to make roads at different places of the exploitation, but always without the assurance of a regular production by the preparation of the deposits. The Supreme Government, attentive always to the support of this important industry, encouraged the local and superior authorities, in order that the coal might be consumed by the State, and offered the miners every protection. Notwithstanding, a little while afterwards, the engineers of the war-ships, most of them foreigners, began to find the coal weak and of bad conditions, and the commanders adhered more or less to their opinions. The bad conditions of

the storage, and the coal being somewhat pyritic, produced some cases of spontaneous combustion, and the navy, the sole consumer of the mines, decided absolutely not to employ these coals, producing thus a conflict for the new-born industry. To avoid this, the inspector of mines commenced an expediente, in which, interpreting the good will so many times shown by the Supreme Government, it was solicited that the navy might continue using the coal of Cebu, and succeeding with his object. The mines, nevertheless, were visibly languishing, above all those of Alpaco, and in spite of the new help made by the province by buying, on account of local funds, the road from the mines up to the anchorage ground of Tinaan.

Both enterprises tried to join again, assembling their efforts at one point alone, and with this object petitioned in 1869 for a mining group in Uling, but it was not able to obtain the fusion, and shortly thereafter the works at Alpaco were extinguished and the most important ones at Uling suspended under the impression of a dismay, in a certain sense unjustified, and just when, as we shall see, by the conclusion of two large shafts, they might have recovered a great portion, if not the whole, of the important capital invested by this enterprise, which, it must be confessed, is the one that has worked in the island with more intelligence, more means, and less government protection than any other.

As will be seen in subsequent chapters covering the periods in Cebu commencing in 1870, like failures followed, and the conclusion of Señor Abella, referring to the failures of both these periods, is so apt, so full of wise suggestion and prudent warning, that it is quoted here in his exact language:

This lamentable history of the coal-mining industry may give very beneficial instruction, if there be avoided in the future the errors in which all these enterprises, one after the other, were involved; possessed of a very laudable enthusiasm, but rather unjustified, and therefore fruitless, animated by which they rush always beforehand to expend their vigor in expensive outside workings and accessories, and before being assured, by a suitable preparation of the deposits, of a production more or less important, but which should have been moderated until such time as the circumstances of the deposit would justify these expenses.

As the history of the mines in other localities is developed, this quotation will naturally occur to the reader and furnishes a comprehensive and clear statement of the reasons for many successive and repeated failures.

Fortunately the development of many coal deposits in every portion of the commercial world, and the extended uses of their products, has made these words of warning of less force for practical purposes in these days, and they are repeated here not so much for the purpose of serving that use at this time, but for the purpose of indicating that the failures of coal mines in the past in these islands is by no means a criterion for passing judgment upon either the nature, extent, or value of the coal deposits of the archipelago, and that they do not, as they should not, cast any serious doubt upon the existence of coal in good situations and paying quantities, and, as the writer believes, after a careful study of some deposits, at least so extensive and of such relatively superior quality, as compared with other coals sold in this market, as to render them of more value than any other mineral

deposit of the islands. This opinion, inserted at this point, seemingly out of place in the history of the coal industry, the writer is willing to allow to stand as a prophecy that he feels assured will in due time be fulfilled and become an established fact.

OTHER LOCALITIES.

By consulting the lists of coal entries of this period (Table I), it will be seen that numerous filings were made in other parts of the island of Cebu, commencing with the town of Danao, in the north of the coal-bearing area, and extending to the town of Boljoon, in the extreme south. Some of these were afterwards worked and developed and have become mines; the most of them remain without investigation, and a few have been clearly proved to be deposits of black volcanic rock, and not coal at all; such are some of the entries in the town of Minglanilla, near San Nicolas, the deposits at Carcar, and others.

Of these deposits the greater portion are on the eastern coast and eastern slopes of the Cordillera, but a few are on the west, notably those of Alegria and Toledo (old town of Jinolanan), which latter deposits are almost directly west from the deposits of Mount Uling.

Except in so far as these were developed and worked in a subsequent period, and where they will be treated of in course, the others possess no historical or commercial interest and need no further comment.

ASSAYS OF THIS PERIOD.

Six samples taken from the deposits of Uling and Alpaco were assayed in the School of Mines at Madrid, giving, in 100 parts, the following results:

	Maximum.	Minimum.	Medium.
Carbon	54.00	36.00	46.16
Ashes.....	20.00	6.00	11.84
Water and volatile matter	44.00	40.00	42.00
Caloric power	5,760.00	4,140.00	4,935.00
Density.....	1.46	1.10	1.23

These coals burn with a brilliant and very prolonged flame.

Another assay from these same deposits gave the following result:

Carbon	51.2
Ashes	4.1
Volatile matter.....	44.7
Total	100.0

Five grams burned five minutes, with medium large flame of yellowish-white color, producing a great deal of black smoke. It did not give coke, but a heavy gray coal. The ashes are ferruginous and

pyretic. Its caloric power was 6016, of which 1926 correspond to volatile matters.

INSPECTOR LASAÑA'S REPORT AND COMMENTS.

To this period the archives of this Bureau contribute but one report from the inspectors of that period, but there are evidences that many others were made, and they are probably to be found in the archives of the Government at Madrid.

The one we have been able to find here, however, furnishes a good summary of the nature and character of these reports and memorials, and casts a flood of light upon the history of the coal-mining industry of the time.

This document bears date of July 9, 1866, and is made over the signature of Señor Cesar Lasaña, the inspector of mines, and is addressed to the governor-general. From it we make liberal quotations, both because of the valuable information it contains and for the quaint, but yet expressive, arguments it advances. It deals with the question of the assistance to be given by the superior government, under the advice of the supreme government, for the encouragement in every possible way of the new-born coal-mining industry.

The inspector had been stationed in Cebu, and was certainly familiar, as no other man was, with all the ins and outs of the business at that date. He says:

It is unquestionable that the newly born coal industry of this archipelago needs a powerful encouragement and protection in order that the resources, solely individual (here where the spirit of association is not developed), may not be unproductive by their scarcity, and in order that the perseverance necessary to reach the results may not be extinguished before the magnitude of the enterprise.

He first pays his respects to the reports from the governor intendente of the Visayas and the commanding general of the navy, stating that he is not altogether in harmony with their respective judgments. "The first says, and he proposes as a measure of protection, that whatever may be the condition of the laborer, let his taxes as a native be paid, the enterprise assuming the responsibility," and that "in the same way he shall be compelled to pay the redemption from personal (military) service, to which all the natives and mestizos (half-castes) are bound; at the same time conceding to them, in case they are constant in their service in the mines for a given period, which shall not be less than fifteen years, and reckoning 40 years of age at least, that they may be exempt from military service, if the enterprise obligates itself to pay the 25 or 30 pesos that a substitute costs at present for each laborer who draws the lot and is sound."

Lasaña continues:

I have transcribed this paragraph entire because it does not occur to me wherein the protection consists that the governor of Visayas wishes to lend to the industry. In a work which, up to this date, Chinos have not been employed, it does not appear

to present any advantage that all pay the taxes as natives; that to free them from personal (military) service, the enterprises paying the redemption, is surely not protection without profit to the Government; while to promise them after fifteen years' work, and at least 40 years of age, exemption from poll tax and military service is to promise nothing, because so improvident is the character of the Indian that only to one not knowing it would it occur to offer him rewards in order that he shall work for fifteen years.

* * * * *

The commanding general of the navy says that the consumption of native coal should be limited to a third part with the foreign coal, and in the face of an opinion grounded on experience and practice it can not nor should not be insisted that it shall be one-half, as has been solicited. * * * That which, in my judgment, should be represented to the supreme government is, that in making contracts for English coal for these islands it should be kept in mind the portion of the navy estimates that should be devoted to the purchase of native coal. I can not agree in the inferiority that is supposed to exist in the coal of Rojas & Co. with respect to that coming from the mines of Mr. Viña. The veins are the same, and the spontaneous combustion to which, for that matter, one as well as the other has the same tendency, is many times the effect of the bad condition in which it is stored in the depositaries of the navy, and of which the interested parties frequently complain.

He next refers to the "luminous report emitted by the united sessions of government and treasury of the council of administration," and which, he declares, "embraces as much as may be said upon the subject."

Of this document (which, unfortunately, we have been unable to find) Inspector Lasaña says:

The council of administration in their very lucid report discreetly divide into distinct classes the measures which may be adopted by the administration to protect and encourage coal-mining enterprises. In one is included those things which have for their object the facilitating of the formation of the enterprises and the execution of the works until the mines are placed in a state of exploitation; and the other, those things which will tend to facilitate the sale of the products and to increase the demand by establishing a favorable competition with foreign coals. The first rule comprises:

First. The complete immunity from customs duties on machinery and all kinds of manufactures and materials which shall be employed and are necessary or convenient for the work of mines; the preservation and deposit of coal and its transportation to the depositaries.

Second. The granting of exemptions and privileges to laborers who voluntarily present themselves to lend their services in the mines.

Third. The official assistance of hands for the works, when the enterprises do not find them spontaneously and in sufficient number.

Fourth. The gratuitous concession of the grounds which, in addition to those exclusively mining claims, might be necessary to them or manifestly useful for pasturing animals employed in the works, for taking out timber for proper objects, the construction of buildings, etc.

Fifth. The pecuniary bounty furnished by the state.

The second rule comprises—

First. The entire immunity also from tariff duty for the exportation of the island coal without distinction of flag.

Second. The like immunity, under the national flag, of articles foreign to the mines of which we treat, whenever they are exported on vessels that, up to a certain extent, contribute also to the use of the combustibles of the mines.

Third. The consumption by the navy, in more or less amount, and by all the establishments of the state in the archipelago, of the combustible in question.

Fourth. The imposition of customs duties, up to the point which is judged suitable, on the foreign and imported coal.

Fifth. The publicity, through the consular agents of all countries, of the existence and quality of the coal that the enterprises might have to dispose of.

Upon these suggestions and recommendations Señor Lasaña comments, in part, thus.

It is unfortunately too true that the lack of hands for work makes a failure in this country of the best combined industrial plans and that in theory appear secure in results. This lack of hands for agriculture and industry has two reasons for existence: The scarcity of population, with regard to the extension of territory, and the opposition of the natives to work.

The first reason is of slow and difficult remedy, and it is but just to bear in mind that the privileges which are to be offered to those who are devoted to an industry will be the cause necessarily of those being displeased who have not these privileges. For this reason these must be granted with frugality, above all in a country in which agriculture is found in a deplorable backwardness and which requires protection from the government.

The second reason is the laziness, which, too, must be treated with consideration. The Indians, and especially the Visayans, are of wonderful sobriety; a little corn boiled in water is sufficient for their nourishment; a bad trouser, and many times a small piece of cloth tied to the waist, is sufficient to dress them; a bad hut is their lodging. Such small needs do not require much work to cover them, but let it not be believed that they do not long for good food or reprove as inconvenient the good and glaring clothes; not at all. It is that their laziness is greater than their needs and vices, and they live happy without satisfying them if they have to work for these things in order to get them.

It is not logical that those who openly break the laws should be compelled to observe them by the offering of rewards for so doing, but rather they should be compelled to do so by force; and as work is a law which is above all human laws, because it is the law of heaven, a different solution should not be sought nor disobedience tolerated in complying therewith. It is all right, by reason of the severity of the work, to exempt them from personal (military) service and neighborhood taxes while they are busy in the mines, but to free them from any army service is a hateful privilege which would bring serious consequences for the injuries which it would occasion to those who have other business or employment not so privileged, and that would bring transcendental disturbances by the abuse to which it teuds.

In the third case—that is, the official aid of hands for the works when the enterprises can not get them spontaneously and in sufficient numbers, being a necessity; in another report upon the same thing, the undersigned was also opposed to this measure, and that opposition was founded on this: The Indian being refractory in lending his personal services, the mining industry, so far from being made secure, would be made repugnant by reason of making the services obligatory. At that time there were employed in Cebu from 400 to 500 men, and sometimes more, in the mines of Rojas & Co. and Viña and in the construction of the roads which lead to them, there never having been seen the need of any such violent measures. Since then the idleness—assisted mightily by clearing the tuba (brandy) from monopoly—has increased to such an extent that the enterprises are compelled to take their laborers from Manila, while the natives abandon themselves peacefully to their instinct of vagrancy and intoxication, without the high wages which are offered serving as any encouragement to them. It must be borne in mind that the works within the mine never could be made with polistas, because it requires a certain amount of experience

and intelligence, which necessitates a term of apprenticeship, above all, in coal mines. But for the construction and preservation of roads and buildings for carrying products to the storehouses, for loading and unloading vessels, and for other works on the surface there is no inconvenience in employing them, paying them their daily wages as voluntary workmen.

Mr. Lasaña thus concludes his own views:

The stimulations which, in my judgment, can be granted are—

First. The immunity from customs duties on imported machinery, manufactures, and articles necessary for exploitation, and also for exportation of native coal without distinction of flag.

Second. Exemptions of personal (military) service and neighborhood taxes while the laborers are busy in the mines, allowing the enterprises to satisfy a moderate amount of those to whom the lot of soldiers has fallen.

Third. The official aid of hands to the enterprises for the outside work when they do not get them spontaneously, paying them the corresponding daily wages.

Fourth. The gratuitous concession of the area which they need for the pasture of animals.

Fifth. The consumption of coal by the navy and by the state departments.

Sixth. The publicity, through consular agents, of the existence and quality of the coal which the enterprises may have ready for sale.

With these advantages the coal-mining industry can be developed and advanced under the shelter of protection, the government being satisfied to do that which it is able to do on its part without serious injury to the other industries.

This era of feverish speculation furnishes valuable suggestions, since it so clearly demonstrates that this kind of mining creates no mines. Coal mining is not fostered and established by speculative entries and an indiscriminate expenditure of capital. It is no less true to-day than it was in the "monopoly period in Cebu." But, not content with the field operations in Cebu, the same parties who were wasting their money in Cebu in a vain attempt to cover all known deposits instead of concentrating their capital and labor at one well examined and thoroughly prospected locality, also undertook to monopolize the coal fields of Tayabas, as will be seen in the next chapter, and with the inevitable result that they failed in both.

CHAPTER VII.—MONOPOLY PERIOD IN TAYABAS AND OTHER LOCALITIES, 1859-1867.

The fever of monopoly that had seized the members of the exploitation firm of Viña, Rojas & Co. during this period was not less virulent in Tayabas than in the island of Cebu.

As early in the spring of 1860 as April 26, one Francisco Villaseñor had applied to the subdelegate of Tayabas for the registry of a coal mine on the island of Pulong-munti, off the west coast of Tayabas and near the town of Pagbilao. This petition reached the inspectorate at Manila on the 18th day of May, 1860.

In the meantime, and on May 1, 1860, one Ramón Dominguez had entered a mine at Manila direct, which he alleges that he had discovered and which was described as being on the island of "Pagbilao

Grande," called by the natives "Capuluan," as shown on the map of the Straits of San Bernardino.

José María Basa had also presented and procured an entry at Manila direct on May 13, 1860, for a mine, which he described as being on the island of Capuluan. Basa's petition came to grief for lack of formalities and was canceled on the 28th of May, while Villaseñor's, for the lack of the filing of a petition within ten days, stating the special designation of his mine and the place where the legal labor was to be done, met a like fate on June 8.

It appears, as a matter of fact, that these three claims were all for one and the same discovery, and on the same piece of land, and was the same mine, to be known later as the "San Francisco," consisting of only one claim.

Ramón Dominguez, having filed his claim as above stated, on May 1, and thereafter complying with the law relating to subsequent records, at once a peculiar contest and a curious dispute arose. Villaseñor held the ground where the mine was located and had the backing of the subdelegate of Tayabas, or the provincial authority. Dominguez had the support of the inspector of mines and had complied with the law, and his representative was sent down with authority and directions to the subdelegate to allow him to work the mine, for the legal labor to be done and completed within the ninety days before which the survey might be applied for.

Dominguez's representative seems to have met with a warm reception, and a long and somewhat acrimonious discussion took place between the provincial authority and the inspector of mines, in which the subdelegate insisted that there was no coal mine discovered on the island described by Dominguez, and protesting his inability to put Dominguez in possession of a coal mine when there was none.

While the inspector seems to have been busy formulating and issuing orders, the subdelegate and Villaseñor seem to have been equally active in finding and creating ways and means to defeat these orders. In such a dilemma, what so natural as to appeal to the great and rich exploiting firm of Viña, Rojas & Co.? And this seems to have been done, for on September 5, 1860, Margarita Rojas shies her castor into the ring, in opposition to Dominguez, in a petition in opposition to his claim of discovery, accompanied by voluminous evidence as to the geography and nomenclature of the islands in the harbor of the town of Pagbilao, which were calculated to prove that Dominguez could not have really been the actual first discoverer of the mine, but had taken advantage of the discoveries of others, and that his mine was, in fact, a mine that was purely existent in his mind.

Unfortunately, the records and the evidence of this first lawsuit do not disclose who really was the first discoverer of the deposit; so silent is the record on that seemingly all-important and material question,

that at this day one is inclined to believe that the discoverer's name is unknown.

The unfortunate cause of all this tempest in a teapot, for so we must consider it at this date, was the reliance that Dominguez had placed upon the official map issued by the Spanish Government in the year 1849, entitled "Spherical Map of the Strait of San Berdardino and Adjacent Islands," in which a small island is represented and marked as Pagbilao Chica (little), and lying near to the coast, while just beyond it is a larger island, nearly cut in two by a small isthmus connecting a larger northern part with a very much smaller part, which is marked Pagbilao Grande (large).

Now, there was a local custom among the natives of speaking of one island in that bay as Little Pagbilao, and the other as Large Pagbilao, and these two alone were represented in that map. The native name for the place where the coal was really found was the island of Capuluan, or Pulong-munti, and these names did not appear on the maps. As a matter of fact, this was not the little island we have first mentioned, and in one sense of the word it was not the large one; it was the little southern peninsula we have described, which at high tide became of itself a separate island, and at low tide was connected with the larger island by a thin band of sand, or an isthmus.

Blind dependence on a map that was old and incorrect, and too much reliance upon reports of strange and local native names for localities, brought Dominguez face to face with stern facts of locations as they really were, but even yet it seemed that the inspector would win out in spite of the evidence of uncertainty as to description and actual location of the discovery.

The contesting faction had another happy thought. Villaseñor had stated that his discovery was in the town of Atimonan, and Dominguez had located his in the town of Pagbilao. Atimonan was a town on the opposite, or eastern, coast of the island and some distance from the mine, while Pagbilao was on the west coast and near to the mine. The local authority of Atimonan, consisting of its principal men, was called together and solemnly declared that the island or Capuluan, or Pulong-munti, where the coal mine was actually located, was certainly in the jurisdiction of their town of Atimonan, and not in that of Pagbilao; and an inspector from another branch of the general government, having looked the ground over and examined the evidence, decided that the town council of Atimonan was right, and the inspector sent the whole accumulation of documents up to the governor-general, who decided the contest in favor of the town of Atimonan and Margarita Rojas; and Dominguez's claim was canceled on May 15, 1861.

In the meantime a firm called Javier Brothers had essayed an entry on the island of Capuluan, alleged to be in the town of Pagbilao, but this seems to have been but little valued, since with no further pro-

ceedings being had, it remained upon the records without apparent opposition from anyone until August 19, 1864, when it was canceled for abandonment.

With this introduction and a brief reference to the contest that opened this period in Tayabas, we call attention to the fact that Tayabas, like Cebu, was immediately run over and covered with all sorts of entries of coal lands wherever a cropping or indication could be found or heard of, only two of which were ever surveyed, and both of these were located on the island of Pulong-munti.

The mines of Tayabas do not appear to have been worked to any extent, and this notwithstanding two Chinese firms—one in 1861 and the other in 1862—had entered claims for coal mines. The boom seems to have expired by 1864, for the entire bunch was canceled in a lump during that year for abandonment.

In November, 1869, a Mr. Trinidad attempted to file a claim on the island of Pulong-munti under the old code of 1846, but the new code of 1867 had come into force, and that effort seems to have fallen to the ground. Six towns shared in this coal boom, of which Pagbilao, Macalelon, and Unisan were on the west coast, and Atimonan, Mauban, and Gumaca were on the east coast. The island of Alabat contains two of these entries lying off the east coast, one being at Sangirin, jurisdiction of the town of Mauban, and the other at Camagung, in the jurisdiction of the town of Gumaca.

The tabulated lists of these entries, with the notes of their disposition, found in Table I, are all that need be added to complete the record of so much of the monopoly period in Tayabas as is required for this work. It does not excite as much interest as does the rush in Cebu, lacking many of the essentially earnest efforts for development that characterized that period in Cebu.

OTHER LOCALITIES.

The records and archives for this period contribute but two other coal locations in the archipelago, one being in Albay and the other in Abra.

It will be remembered that Manuel de Castro, a resident of Sorsogon, had on May 30, 1853, located a coal mine in the subdivision of Sorsogon, in the province of Albay, which he described as being near the visita of Parina, town of Casiguran, and at a place called Carisan.

On June 25, 1861, he renewed his petition for this same deposit, making a petition for designation on the 3d of July following, in which the location of the mine is described as being in the town of Magallanes. On September 5 he petitioned for its demarcation, and on the 15th of the same month it was surveyed, and from notes of the survey in the mining bureau we learn that there were eight galleries opened upon the deposit, the largest of which was 17 meters long. On

October 8, 1861, formal possession of the mine was given to De Castro. It is noted in the archives that this mine is canceled but that the date of its cancellation was unknown. No map or plan of the mine is found. The location made in 1861 is declared to be identical with the one of 1853 by the same party, and in the latter location he gives to his mine the name "Reyna de Castilla."

Don Francisco Javier Centuri6n y Zapata, a sublieutenant of infantry, resident at Fort Gibratfaro, under date of December 12, 1863, petitioned for two claims on the left bank of the river Malanas, in the rancheria of Paganas, province of Abra, designating his discovery as the "Mina del Sol." On the 14th of the same month it was admitted at the office of the provincial governor; on the 18th it was remitted to the inspectorate at Manila; on the 22d of December the designation was made by a petition which in due course reached the inspectorate on the 8th of January, 1864. The period of ninety days allowed for performing the legal labor and applying for survey having expired without further application, the claim was canceled on May 10, 1864. We have no further information in regard to this mine or the coal deposit upon which it was located. With the end of this period the code of 1846 disappears, being succeeded by the more elaborate code of 1867.

CHAPTER VIII.—THE CODE OF MAY 14, 1867.

The date of May 14, 1867, will ever be a memorable one in the history of the mining industry in the Philippines, since on that date the royal decree was issued from the palace at Madrid, in which a clear, concise, and very specific code and regulations for the future government of mining of all kinds was issued, and which in terms expressly repeals all other laws up to that date upon the subject of mines and mining. Not less so is the date of May 6, 1868, when this new code, with its accompanying regulations, was formally published in the Gazette at Manila and became operative as the fundamental mining law of the Philippines.

While I am free to confess that this law has been by no means satisfactory in its operation, as will be seen by the examination of the proceedings had under it, I am as free to admit that theoretically it is without serious fault. I do not believe that it was possible to execute it in the actual administration in conformity with its provisions and the really splendid theory upon which it was based. The comprehension of its intricate procedure, so positive and minute in its details, could not be expected from the ability of the provincial authorities charged with its administration and conduct. There is abundant proof that it was not so comprehended, and while it was in theory a vast improvement upon the code of 1846 it was by no means an unqualified practical success.

The most marked change in the proceedings was the retention in the provincial offices of all the documents and papers until such time as all the prerequisites for a survey were complied with, when it was for the first time remitted to the general inspectorate of mines. Hereafter in this volume, therefore, no notice will be taken of those curious and peculiar entries that were solely and purely speculative, and which were made possible and even encouraged by the exceedingly simple and liberal code of 1846.

So far as it relates to coal mines, the basis of this law, in its more important features, was the definition of the size of claims, made 500 by 300 meters each, and allowing several of these claims to be united, and beyond the minimum allowed to one person or corporation, of four claims, up to any number in a coto (group), provided it should be accompanied by a certificate from an engineer showing the importance and benefit to the State of such grant in large tracts, from an economical and industrial point of view, and when accompanied also by a plan showing the location of the coto, also prepared by an engineer, and made accurate, definite, and certain.

The canon tax was also suspended on coal-mining properties for the period of thirty years from the date of the publication of this law, and also for a like period the 3 per cent tax upon the gross output of the mines.

The proceedings allowed the entry of coal lands and other mineral lands without regard to whether the lands were public lands of the State, the property of pueblos, or of private ownership, it only being necessary, in case the discovery should be made upon lands of private ownership, that the permission of the owner should be first obtained; or, in case of refusal, the authorities might grant such permission upon the payment of damages and the giving of certain securities for further damages that might occur. The owner, however, had a specified time within which he could exploit the mineral lands of his private ownership if he so desired; failing in that, the condemnation proceedings would be had and the lands would be exploited by the discoverer of the mineral, as stated.

To give a general idea of this course of procedure, we quote from this law and its regulations those principal steps which are called the "main proceedings:"

First. The admission of the petition.

Second. The publication of the description.

Third. The permission or refusal of prospecting and exploitation or of commencing work.

Fourth. The notice to the effect that the permission of the owner of the ground has been asked.

Fifth. The presentation of the certificate of the making of the mounds (landmarks).

Sixth. Notice to the effect that the work required by law—the examination and staking out of the ground—has been made.

Seventh. The filing of the record with the superior civil governor (through the inspection general de minas and the administracion civil).

Eighth. The concession or refusal in any of the cases stated in the royal decree and in the regulations.

In addition to these matters, all of which were to be noted in books of record in the provinces, there is specifically provided sundry other entries, such as:

First. Remittance of the records to the engineers;

Second. Their return;

Third. The presentation of ground plans and stamped paper by the parties; and

Fourth. All things tending to show the date upon which different formalities and requirements in regard to the proceedings took place.

Judged by these two skeleton abstracts of essentials in a record, it may be readily imagined that the cases are rare indeed when a record came up from a provincial governor to the inspectorate of mines perfect and complete in all its numerous details. Such was the fact, and again and again were they sent back for correction in details and for the completion of forgotten and overlooked steps, certificates, and procedure, and both time and patience were consumed in these proceedings.

The course of a petition may be followed here, in a colloquial way, to give the reader a more general and connected idea of the meaning of these provisions.

The right to prospect the public lands for mineral deposits was free; this prospecting, however, was limited to an excavation of 3 meters in depth; thereafter further investigation and prospecting must be preceded by authorization of the provincial authorities, either upon a petition for registry outright or upon a petition for investigation that might subsequently be turned into a registry when the mineral was found, and when found in paying quantities must be so converted. A prospect is sunk for 3 meters in depth and a mineral deposit is disclosed; the discoverer then makes out a petition describing the discovery and location and asking for a registry of this mining right. He selects for it a name, presenting this petition to the civil governor of the province, with a letter of payment showing the deposit of \$37.50 with the collector of internal revenue of that province to insure the payment of the expenses of survey. The governor orders the admission of the petition. He then orders the publication of edicts and the posting of notices of the claims made. The edict is then written up and forwarded to the gobernadorecillo of the village and town in which the mine is located; that official for three consecutive nights publishes the bandillos, as it is called, going through the village attracting attention by bell or some other way, and crying out in a loud voice the edict of the governor in the dialect of that community, and of this he makes a certificate and return to the governor. At the same time the secretary of the province or some other official authorized posts upon

the bulletin board of the tribunal house of the province and the accustomed places a copy of the edict, maintaining it for sixty days, and of this certificate and return is made. If no protest appears in the meantime the owner of the mine may proceed with his denouncement proceedings. The governor in the meantime has given him permission, provisionally, and saving a better right, to go on with the work of developing the mine so as to establish its value sufficiently to determine whether it will justify further exploitation and a survey by the engineers of the department.

Within four months of his entry he must submit samples of the mineral, accompanying a petition asking for survey, and then all the papers, orders, decrees, certificates, etc., being joined together as they are presented to the provincial governor, are sent up to the inspector of mines, who proceeds to examine the procedure had, and finding sundry errors and omissions, adds a report to the expediente, as the collection of papers is called, and advises the department of civil administration, with his recommendations, as to what ought to be done with it under all circumstances. In general this recommendation is that it ought to be returned for correction to the office and officer of its origin. If the directorate approves, it is sent back to the mining inspector, and finds its way through that source to the civil provincial governor; and finally, and within six months from the final return of the perfected and completed record, to the inspectorate. If the time is not extended, the engineers make the survey and recommendations as to the granting of a concession. While many other offices and officers intervene with certificates, advice, etc., the governor and captain-general alone was authorized to issue the title or concession, and up to the time it is so issued and the party placed in possession the proceedings are declared to be purely administrative.

No attempt is made to give all the many and varied proceedings of a title, and its antecedent proceedings, complete in this chapter. For these we must refer the reader to the compilations of the law on this subject, and the many interpretations and constructions placed thereon by administrative branches of the government, and for this an entire volume would be required. In spite of this intricate and theoretically perfect law, so poorly understood and so difficult to follow in practice, it was a real boon to the mining industry, and to the coal mining industry in particular, and under it great progress was made.

The sense of insecurity under the old law, the constant menace of new rules of aid and assistance to specific localities over those of others, and the possibility of a monopoly in production were so far reduced as to place the coal industry very nearly upon a purely commercial basis, and as soon as the law came to be understood in its general scope, objects, and purposes a new era was developed, characterized by the more careful and systematic investment of capital and more

business-like methods of operating and developing the deposits. Upon the whole, the code of 1867, and the progress made thereunder in the following twenty-two years and up to the time of the American occupation, challenges our admiration, and while the writer does not believe its continuance, either in theory or practice, is advisable, he freely admits it has served well its purpose, and its learned authors have our sincere respect, as their work indeed merits commendation from the student and historian.

CHAPTER IX.—COAL DEPOSIT OF “LA MINA,” CAMARINES SOUTH, 1871-72.

The Code of 1867 was published on May 6, 1868, and the theater of action was changed, as will be seen from the list of coal claims that have been registered under this law, found in Table II. The provinces of Albay and Cebu easily lead in the list of rival claimants, including, as they do, the deposits of Sogod and the island of Batan in the former, and Danao, Compostela, Uling, and Lutac in the latter.

Table II includes all mineral entries of coal that are noted in the general inspectorate of mines at Manila, commencing with the “Purissima Concepcion,” of sixty claims, instituted November 18, 1869, and located at Mount Uling, in Cebu, and ending with the “Butuan,” of four claims, instituted on January 12, 1899, and located in the island of Batan, in the province of Sorsogon (Albay). In this table, properly designated as first, second, and third-class claims, in accordance with the designation adopted by the mining bureau under American administration for the purpose of classification, will be found the concessions granted and not formally canceled, constituting the first class; the mines awaiting demarcation, constituting the second class; and the petitions presented at the inspectorate of mines, at Manila, in 1898-99, and admitted by the Spanish inspector, Luis Espina y Capo, in violation of law, and the validity of which is denied, constituting the third class.

Under the Code of 1867 the enterprises were more independent in their plans of development, while not breaking loose entirely from the promise of public assistance; they provided a larger amount of cash capital, and engaged in a more systematic expenditure of their funds, and really made much progress. At least they have demonstrated the fact of the existence of coal in paying quantities and of excellent quality, and made the future of the coal-mining industry a commercial possibility, with only a reasonable expenditure in determining suitable localities and plans of exploitation to be adopted.

With this introduction we pass to the consideration of the “La Mina” mine, in South Camarines, the especial subject of this chapter.

On February 14, 1871, the alcalde mayor of South Camarines remitted an expediente, commenced on the petition of Antonio

Arejola, asking for a coal-mining concession at Boraboran, between the towns of Navua and Bato. The petition was prepared under the Code of 1846, and on February 27, 1871, after being noted in the books of registration, the inspector of mines returned the documents to the alcalde mayor, with instructions to proceed in accordance with the Code of 1867, preserving the priority. The mine was evidently abandoned eventually, since there is no record of survey or application even for a concession. It was, however, worked to some extent, for on September 4, 1871, we find the general inspector making this reply to the owner's application to take out and ship to Manila 100 tons of coal:

This inspectorate has carefully studied the petition of Antonio Arejola, which the alcalde mayor of South Camarines remits and recommends, asking authorization to sell, once only, 100 tons of coal taken from the mines of the jurisdiction of the town of Bato.

The mining law in force prohibits in express terms, in article 58, the disposing of minerals taken out until the miner has obtained the title of property, or his *pertenencias* have been demarcated, without any opposition, by an engineer of mines. This article, which the petitioner allows himself to call the death blow to mining development, is, on the contrary, the most secure guarantee of good faith, both on account of the State and the individual; for the State, because a mine being its own property, the governor, as administrator of it, ought not to deliver it to the first stranger without requiring from him, in exchange for such a property as an important concession, certain formalities that will guarantee the good use of the hidden riches; that will assure the future of the exploitation, preventing an individual from rendering useless for all time, by an avaricious exploitation or by a deficient understanding, the riches that other, better, and more intelligent men might be able to present entire to the nation; that will guarantee, finally, the life of the operatives occupied in the dangerous mining works, and which may threaten them by lack of intelligence or misunderstood economy in the exploitation.

The article cited is likewise a guarantee of good faith for the individual, because at employing his capital in mining he immediately counts with safety of possessing that which he purchases; he knows what he possesses, because the Government, by means of its skilled officials, has declared it, and, in consequence, he does not find himself liable to be exposed as the victim of a charlatan or bad faith. We have a very eloquent example of those concessions of that character in the Peninsula, under the law of 1849, which, by reason of its not exacting due guarantees from the registering parties, gave rise to the scandalous fluctuations, as we all know, and that without doubt would have ruined the credit of this industry if the law that to-day governs in this island had not appeared in the year 1859.

What would happen, most excellent sir, if at conceding the authorization that is solicited for the sale of 100 tons of coal to be delivered in Manila and sold, and being tried they should give a brilliant result, and upon this basis there should be formed a company who delivers its capital to the so-called registerer and proprietor, and after all this the Government should not concede the property, either because free land does not exist, or because the registerer has not complied with the requisites that the law prescribes, or, finally, because another registerer, having complied with the legal prescriptions, claims the property? The answers are clear: Capitalists, being defrauded, will protect themselves before embarking their capital in a mining industry, and this petitioner would be the first victim of the "dose of liberty" that he asks, and that should be better entitled a "dose of license and informality."

It appears, most excellent sir, that there is a decided firmness on the part of this registerer to exempt himself from the law, because, being given the facilities that the law offers in order to acquire mining property legally, it is not understood, since the registerer allows more than five months to pass by since his first petition without asking the demarcation, the expense of which would have been less than that of mining the 100 tons of coal, when, according to article 30 of the royal decree, he ought to ask for this within the period of four months, and, according to article 31, the alcalde ought immediately to order the examination and demarcation to be made by an engineer, and the lack of an engineer in that province can not be alleged as a serious reason; in the first place, because the registerer has no business to concern himself with this purely administrative detail, and the alcalde, acquainted with the administrative organization of the country in general, and even by means of the aforesaid regulation of mines, in the one hundred and seventh article, knows very well that there is no engineer of mines except the chief of the inspectorate, resident in Manila, who always goes where the administration calls him within the period that the law determines.

This inspectorate, then, thinks that there is no occasion for the permission solicited, and begs your excellency to be pleased to state to the alcalde mayor of that province the desirability, for the good of the service, that expedientes for mines be adjusted in advance to the legislation in force, which, for liberality and justice, is considered one of the best in the world.

The auxiliary engineer, Valentin Mariano y Corpo, was thereupon dispatched to the Camarines for the purpose of making an examination of the mine near Bato, at the village named La Mina, and above referred to, together with other mineral properties situated in the two Camarines; and from his report, submitted early in the year 1872, we are enabled to give a more complete description of this section of Bato and its carboniferous deposits.

The village of La Mina is located in the southeast part of the province of Camarines South, near to the boundary between it and Albay; it is about 6 miles from the town of Bato, located on a lake of the same name, in which the river Bicol has its source. Its distance from Nueva Caceres is approximately 25 miles. The carboniferous deposit which gave name to this village is located in the great mountain chain which crosses the greater part of the length of Luzon and in this province runs near to and parallel with the western coast.

Leaving Lake Bato and traveling toward the southwest, at a distance of a little more than a mile the district begins to rise, forming hills covered thickly with vegetable earth, resting upon slaty clay of dark-gray color. As the advance is made into these hills toward the coast they become more rugged and more or less prolonged, some of them appearing as if whittled to a point, and are separated from each other by short valleys, with little arroyos and narrow canyons, and so supporting each other they gradually gain in altitude to the divide of the mountain chain, and near this point the coal was found. The locality is almost entirely covered by a thick layer of vegetable earth, and the hills and mountains from base to summit are occupied by great forests, the vegetation being so thick as to make it difficult to pene-

trate them. These difficulties made the geological structure difficult of examination. The hills seem to rest upon a base of calcareous tufa, or mountain limestone, exceedingly firm and solid and in banks of enormous thickness, the stratification in many places appearing very discordant. Farther up the divide are found clayey slates of many colors, violet and gray predominating, and more or less brittle, which constitute nearly the entire formation. These clayey slates become sandy in the neighborhood of the coal deposit, and upon these sandy formations the deposits rest. In the same neighborhood are veins of alabaster (gypsum) of notable whiteness and transparency, and which possesses the property of becoming harder when exposed to the air; it is heavily charged at some points with arsenical pyrites and is susceptible of receiving a beautiful polish. There are also veins of ochers, yellow and red, and some banks of plastic clay of a dull red, undoubtedly due to an excess of oxide of iron. Such is the general topographical and geological description of the locality as given by Engineer Valentin Mariano in 1872.

The coal outcroppings appear on two of the last foothills which constitute the summit of the range, and which may be considered as the watershed between the Pacific and the opposite coast; it is also disclosed in the bed of an arroyo which has its source through a narrow canyon which separates them. The coal alternates with varieties of carboniferous slates. They are from 2 to 8 centimeters thick, running in a direction N. 20° W. by S. 20° E., with a dip apparently to the west 20° south, and at an inclination of 60°, the direction and inclination being naturally equal to that of the rocks of clay formation which serve for a cap layer. There are indications of other deposits in the surrounding hills, promising a greater extension and more vast proportions than that which at first appears to view. But very little work had been done upon the deposits, and the prospect pits had been filled up with refuse from floods when examined. A coal was disclosed presenting well-marked characteristics; black in color with rainbow tints, it is not very brilliant in general; it is light in weight and somewhat brittle, with a tendency to separate into small fragments of a rhomboidal, prismatic form. This fragility, it is inferred, is caused by reason of organic decomposition on account of the waters and the atmospheric agents, because of its proximity to the surface. It can be reasonably expected that when the workings gain some depth on the deposit a true coal may be found, more compact or less brittle. Subjected to small tests, the coal appears of good quality. It burns with a large flame, without swelling or expanding and without cracking during the act of combustion. It leaves very little ash and appears to carry a large percentage of fixed carbon. The engineer is of the opinion that it could be used to advantage in the burning of lime and

brick and in the forges of the iron works, the latter use of it having been proved in practice.

As might be expected from the general description of this country above stated, the enterprise was handicapped by the problem of transportation. The coal must be carried from the place where it is mined, near the summit of the mountains, to a depository on another slope of the range and then an estimated distance of 3 kilometers toward the south, where it can be shipped from the anchorage near Viramac and Pantao. For this purpose the coal must be carried upon the backs of carabaos, the roads consisting of a narrow footpath for the crossing of the crags of the sierra, scarcely practicable, but the only means of transport employed, and in the rainy season not possible at all because of the slippery path and the swollen arroyos.

The engineer thus describes the method of mining that he found in vogue:

The means employed for its exploitation up to this time are the most simple, since they consist in taking out in the clear, open light of the day with a pick and crowbar fragments of coal where it conveniently appears at the surface.

Notwithstanding these primitive methods and the laborious transportation, at the rate of 2 quintals for each carabao, one day required in going and another in returning, a ton's weight of 22 quintals could then be put into the bay of Manila at a cost of \$4 (Mexican) per ton. The engineer who made this report was not carried away with enthusiasm unwarranted by the conditions, and from his able report we quote with approbation the observations of that date and commend them to the coal-mine promoters of the present:

In spite of the fact that the coal found appears to be of good quality, and, according to the results of the trials made in a small way up to date, a satisfactory combustible, yet neither will the State, on account of its ships, nor will individuals, be willing to expend any capital in their acquisition except that trials are made on a larger scale and it has completely and in a precise manner been placed in evidence whether this coal certainly possesses the necessary conditions for its application to industry. Until this point, of such essential importance, is satisfactorily decided, it is useless to found hopes that will later prove delusive, defrauding the shareholders, and with great prejudice to the industry. And, finally, the place where the veins at present discovered are shown, situated as it is in a district furrowed by narrow valleys inclosed by rugged hills, where there is a lack of sufficient space, where there is an arroyo that, as has been said, crosses the veins of coal, whose waters being filtered through between the union of the stratification would inundate the excavations at a slight depth of the workings, occasioning a continuous expense for its extraction—here, in this class of exploitations, where only the most strict economy in the expenses and a large output of mineral can give indemnification by its slight intrinsic value, there should not be put aside the necessity of looking at a lower level for other veins of greater thickness, and whose coal naturally contained would be of better quality than that found. There ought, besides, to be added to this that the place in question, covered throughout with a heavy forest, is an injury because of the sanitary conditions.

The engineer proposes, in substance, that the enterprise proposing the exploitation of these coals should direct its attention to the other slope of the range adjacent to the sea, and after a minute study of the district let an exploration gallery of regular dimensions be opened, beginning from the lowest level possible that will normally cut the stratification containing the coal deposit. By this means the most perfect and economic examination of the deposit would be accomplished; encountering the coal at a much greater depth, the quality would be much superior and the expense of opening shafts would be avoided, always more difficult in timbering and construction, and the cost of taking out the waters accumulating would be much reduced, since the main gallery so constructed would furnish a means for natural drainage. Other advantages, such as the avoidance of transportation by carabao over the mountain passes and arroyos and the delivery of the coal by tramway at the wharf, where it could be loaded direct upon the ships, will suggest themselves.

No further reference to this mine has been found, and nothing more is known about it at this time. Its description seems to warrant its further examination with a view to its exploitation, and along the lines suggested in the report of 1872, from which we have quoted.

CHAPTER X.—“RAPIDA DESCRIPCION DE LA ISLA DE CEBU,” 1867-1886.

By reference to Table II it will be seen that, commencing on November 8, 1869, with the “Purísima Concepción,” at Mount Uling, eight concessions were asked for in Cebu, consisting of 82 pertenencias and embracing 12,300,000 square meters. Of these six concessions of 80 pertenencias were granted, embracing 12,000,000 square meters. These were divided as follows: The “Purísima Concepción,” at Mount Uling, 60 claims; the “Esperanza” and “Caridad,” at Compostela, 8 claims; the “Santa Rosa,” “Magallanes,” and “Legaspi,” at Danao, of 12 claims.

The concessionaries were, respectively, Antonio Ayala (Rojas & Co.), Isaac Con-úi, and Pascual Veloso, and the titles were issued in 1870, 1873, and 1874. All of these claims were eventually abandoned and canceled.

In the year 1886 there was published in Madrid a volume entitled “Rapida Descripción, Física, Geológica y Minera de la Isla de Cebu,” the work of that eminent mining engineer, Enrique Abella y Casariego, chief engineer of the corps of mines, and whose work in this bureau has been found to be of incalculable assistance and great value.

As this author has fully and completely covered the subject of coal in Cebu for the period stated at the head of this chapter, we shall insert a translation of that work, so far as it relates to coal in the island of Cebu, and entirely without comment on our part.

The author gives the following complete classification of the localities where coal (lignito) was known to exist in the island of Cebu:

Selvero (formerly "Santa Rosa" mine), Danao.	Guila-Guila, El Pardo.
Lugayon (formerly "Santa Rosa" mine), Danao.	Arroyo Buut (Mananga), El Pardo.
Mouth of the Arroyo Camansi, Danao.	Mount Lutac, Naga.
Arroyo Bairan, Danao.	Arroyo Sibod, Naga.
Mantija (formerly "Legaspi" mine), Danao.	Alpaco, Naga.
Arroyo Magliji (part of above), Danao.	Nasipit, Naga.
Arroyo Baisabais, Danao.	(Perfect lignite), Nasipit, Naga.
Cajumay-Jumayan, Danao.	Cambanga, Naga.
Licos (Mine "Caridad," gallery "Es- peranza"), Compostela.	Campacan, Naga.
Licos (another point of the gallery "Esperanza"), Compostela.	Santicon, Argao.
(Alignite mixed with sand), Macurong, River Parel, Talamban.	Mantalongon, Dalaguete.
Matug-iro, River Butuanon, Talamban.	Canensay, Boljoon.
Arroyo Taptap, Talamban.	Bairan, Boljoon.
(Ferruginous lignite), Guila-Guila, El Pardo.	Cabagaquian, Alegria.
	River Boijoan (Guinanon), Alegria.
	Actiue, Toledo.
	Actiue (another outcropping), Toledo.
	Maulincop, Balamban.

MINERAL DESCRIPTION—HISTORICAL SKETCH.

The first mineral coal discoveries in the Philippines were made in the island of Cebu in the year 1827; but this discovery did not arouse any interest either in the State or in individuals until the coming of the first steamships to these islands was announced, when the superior civil government, in the year 1842, issued a timely circular to the provincial authorities requesting them to furnish information regarding any coal deposits that there might be in their respective localities.

Information and samples from Cebu, like all the rest, were sent to the general inspectorate of mines, but recently established in the archipelago, and upon the accounts given by Mr. Isidro Sainz de Baranda, at that time the zealous inspector of the department, some speculators examined several parts of the island of Cebu, resulting in the presentation of a petition in April, 1853, for the necessary ground for an exploitation at the place called Guila-Guila.

In the previous year other outcroppings had been discovered in the town of Danao, and upon the orders of the provincial authorities samples from these were sent to Manila, whereupon the superior governor of the islands, wishing to reserve these deposits for the State, and after admitting propositions for a sale of the concession made at Guila-Guila and prohibiting the admission of new mining registries upon the island of Cebu, commissioned the distinguished engineer, Mr. Antonio Hernandez, to examine all the deposits, to appraise those of Guila-Guila, and to send to Manila 40 or 50 tons of the coal that should be taken out of the deposits of Danao by the administration and under the instructions of the engineer.

Mr. Hernandez complied with his instructions, presenting a concise and notable report, in which he classified the combustible as a lignite and the veins of coal of Danao as thin and irregular, and described the works of the enterprise of Guila-Guila in full detail, drawing a conclusion that these coals were of an inferior grade.

The projected purchase of the Guila-Guila mines and the unfortunate idea of the exploitation on account of the State having been rejected by the Government of

Spain, and having tested the coals of that concession with favorable results in some of the steamers recently arrived at the islands, the building of a road from Guila-Guila to the shore was commenced before they had perfectly examined the deposit and calculated the disposable field of workings and so learned the production that might be expected. The Government contributed with 200 prisoners, the province with 12,000 polistas, and 4,000 or 5,000 pesos for materials, and Mr. Hernandez offered himself, with the greatest disinterestedness, for the execution of the work as projected. But in the meantime the workings of the mines, which had been irregularly commenced by the proprietors, and which were afterwards put in order and continued under the well-directed advices of Mr. Hernandez, gave their results, establishing, says Mr. Lasaña, from whom we take these accounts, enormous breaks in the deposits, and the almost complete disappearance of the combustible; a sad ending for an enterprise that had spent 70,000 to 80,000 pesos in their works, and who shall always have the merit of being the first in furnishing the means to establish such a profitable industry in the country.

As a curious fact we must point out that although the Supreme Government, advised by the superior mining junta, had already refused the idea of exploiting the coal mines of Cebu for the account of the State, the superior government of the Archipelago, doubtless in love with its design, though not with the funds of the State, still making free with the funds of the province, attempted an exploitation. Strange indeed, directing the governor of Cebu to denounce the best deposits of his territory, and to propose afterwards the most appropriate way to exploit them. Fortunately this order was not accomplished, or there were presented other difficulties which made it impossible of realization.

In spite of the failure of Guila-Guila the members of the exploitation association of Viña, Rojas & Co. did not become discouraged. This association dissolved, and in 1859 the firm of Rojas & Co. on the one part and Viña on the other took advantage of the raising of the order prohibiting the registration of mines in the island, the first mentioned establishing themselves at Uling and the second at Alpaco, beginning the new works with enthusiasm. There was entered throughout the island for the account of both mines, as is always the case, a multitude of mines which were not worked, because, probably, they were made with only the object of monopolizing all the lands containing coal, on the chance of a favorable result that the mines of Uling and Alpaco might produce; so it is that they renounced these or allowed the time to expire in order to register several times, as may be seen in the statements of concessions petitioned for in the island.

In April, 1861, the commanding general of the arsenal passed by Cebu, and being informed of the existence of these mines he ordered that the coals be tried in a gun-boat. These trials were again repeated with success in other vessels of more power, and the owners of the mines, encouraged, started to make roads at different places of the exploitation, but always without the assurance of a regular production by the preparation of the deposits. The Supreme Government, attentive always to the support of this important industry, encouraged the local and superior authorities, in order that the coal might be consumed by the State, and offered the miners every protection; notwithstanding, a little while afterwards, the engineers of the war-ships, most of them foreigners, began to find the coal weak and of bad condition, and the commanders adhered, more or less, to their opinions. The bad conditions of the storage, and the coal being somewhat pyretic, produced some cases of spontaneous combustion, and the navy, the sole consumer of the mines, decided absolutely not to employ these coals, producing thus a conflict for the new-born industry. To avoid this the inspector of mines commenced an expediente in which, interpreting the good will so many times shown by the Supreme Government, it was solicited that the navy might continue using the coal of Cebu, and the petition was granted. The mines, nevertheless, were visibly languishing, above all those of Alpaco, and in

spite of the new help made by the province by buying on account of local funds the road from the mines up to the anchorage ground of Tinaan.

Both enterprises tried to join again, assembling their efforts at one point alone, and with this object petitioned in 1869 for a mining group in Uling; but it was not able to obtain the fusion, and shortly thereafter the works at Alpaco were extinguished, and the most important ones at Uling suspended under the impression of a dismay, in a certain sense unjustified, and just when, as we shall see by the completion of two large shafts, they might have recovered a great portion, if not the whole, of the important capital invested by this enterprise, which, it must be confessed, is the one that has worked in the island with more intelligence, more means, and less Government protection than any other.

In 1870 appears for the first time the first metalliferous registry of lead, and although it was soon abandoned there was established the next year, and with great enthusiasm, a mining company entitled "La Cebuana," at Manila, as a consequence of the wonderful result given by some trials which proved that the mineral was lead containing an extraordinary amount of gold and silver. With this discovery the old mining enthusiasm of the island seemed to revive somewhat, and in 1871 the mines of the town of Compostela (formerly comprised in Danao) were again petitioned for, and two years later those on the banks of the Danao River.

In the meantime "La Cebuana," which had undertaken with so much enthusiasm the working of their mines of Acsubing and Panoypoy, had dissolved, and their mines were abandoned; these mines were again registered in 1876, but owing to legal defects in the procedure, which the proprietors did not care to amend, they were not even surveyed. In the Compostela district some workings were undertaken, which, in spite of several interruptions, have continued up to date (1886), but in such a slow way that the total production of coal is an insignificant fact. Nevertheless these mines have received in the way of official help and protection the necessary "polistas" for the construction of a road leading close to the shore, the consumption of their coals almost constantly by the gunboats of the Cebu station, and the reiterated and always impartial counsels of the engineers of the department.

The mines on the banks of the river Danao also commenced work, but their workings were executed without reasonable direction and knowledge of the mining industry, and at the same time they undertook the construction of a road from "Santa Rosa" to Danao; but in a short time also these works were abandoned, as it appears, on account of the commercial embarrassment of the proprietors, who were especially engaged in other lines of business.

This lamentable history of the coal-mining industry may give very beneficial instruction if there be avoided in the future the errors in which all these enterprises, one after the other, were involved; possessed of a very laudable enthusiasm, but rather unjustified, and therefore fruitless, animated by which they rush always beforehand to expend their vigor in expensive outside workings and accessories, and before being assured, by a suitable preparation of the deposits, of a production more or less important, but which should have been moderated until such time as the circumstances of the deposit would justify these expenses.

After treating of the lead, gold, and silver, and placer-gold deposits, the author continues his review of combustibles, as follows:

COMBUSTIBLE MINERALS.

The combustible minerals of Cebu have been the object of various classifications. In the first place, the distinguished engineer, Mr. Antonio Hernandez, visited its deposits, as we have said, in the year 1855, and although he did not pretend to make a proper geological study of them, he classified them as lignites, this opinion being

taken for granted by him in his unpublished reports, still preserved in this department, where we have so many times consulted them with excellent results. Some years afterwards, and as a result of some trips to the island, Mr. Centeno saw in the limestone formation of the old coast reefs the limestone formation of the mountains of the carboniferous area, and denying at the same time the vegetable signs which can, notwithstanding, be observed in the coals of Cebu, classified them as true pit coals, contained in a carboniferous bank so extensive that, passing under the Straits of Tinaan, they reappeared in certain outcroppings discovered by the miners of Alpaco in the island of Negros.

Still, the lignite nature of these combustibles, as pointed out by Mr. Hernandez, is the one that has prevailed; and it could not be otherwise, for, as we shall see later, not only their physical, chemical, and mineralogical characteristics are sufficient to establish this beyond a doubt, but also, as we have seen, the geological examination of the coal veins and the determination of its recent age, as shown from the classification of the fossils, also confirm plainly the same conclusion.

Therefore, laying aside forever the erroneous idea of the carboniferous area of Cebu, it is well to bear in mind that although the extension of the coal indications in connected form is considerable enough, inasmuch as there is scarcely a town that does not contain them, from Balamban and Sogod up to Malabuyoc and Boljoon, it does not follow either that they may or must have any relation with each other by means of inferences of the considerable extension of the strata either in direction or depth. On the contrary, its recent age and its lignite character presupposes, *à priori*, the existence of isolated and interrupted deposits, among which there might be some that, nevertheless, have a real industrial importance, either because of their entity or relative development, as well also because of the excellent quality of the combustible. We need, then, to examine carefully these two last conditions, and for that we shall divide into three parts that which refers to the combustible deposits, and so treating—

First. Of the quality of the deposits.

Second. Of the quality of the coals.

Third. Of the general conditions.

QUALITY OF THE DEPOSITS.

In order to understand the entity of the deposits there is nothing better than the study of the more or less extensive works that have been executed upon them, in which we can observe the character of their course and extension, both vertical and horizontal, deducing therefrom not only their relative importance, but also the best plans to be adopted for their greater industrial profit. We shall describe, then, firstly, the deposits which have been the object of works of any kind, following the same order in point of age that we have named in the historical sketch, and we shall therefore commence with the

MINES OF GUILA-GUILA.

After more than twenty years of abandonment it is easily understood that we could hardly be able to examine the old works of the glen of the river Mananga; but in order to record and know the entity those exploitations had we will appeal to the exact reports given by Mr. Hernandez, in 1853, reviewing, first, to a slight extent, the circumstances of the appearance of the outcroppings that we were able to find ourselves in that locality.

The present outcroppings.—In the river Alpagate we saw the first indication with a thickness of 15 centimeters, extending from NE. to SW., with an inclination of some 35° to the NW. The outcropping of the arroyo of Buat was some 15 to 20 centimeters in thickness, with a direction from NNE. to SSW., inclining 20° to ESE.,

lying between brittle clays, of which that of the slopes presented pieces of limestone in its mass, similar to those of a breccia formation.

Lastly, at the bank of the river, in the place called Guila-Guila, we saw one uncovered vein of 30 centimeters in thickness, extending from ENE. to WSW., inclining 25° toward SSE. Further up the river, at Jimaumauan and at other places, there is sometimes discovered insignificant small veins, which, even less than the others, merit attention from an industrial point of view.

Executed works.—The works of these mines consist, according to Mr. Hernandez, of two shafts and four galleries. The shaft of the mine "Porvenir," located a few yards from a creek in which the water has disclosed a layer of coal, is 14 feet long, 8 feet wide, and 12 feet deep; in one of the upper portions a coal layer is disclosed which runs in a direction NNE. to SSW., with a mean inclination of 45° to WNW., resting for a foot wall upon a fine gray lead-colored clay, and covered on the top by a broken limestone formation, very solid, which is separated from the coal by a layer of clayey sand. The layer of coal, which appears clean in the bed of the creek and so continues for some feet in depth, is found in the shaft at a depth of 12 feet, full of small sandy veins that take up very nearly one-half of the thickness. The forty tons of coal that were tested in the steamship *Alcano*, and with satisfactory results, was taken out of this working. From this point, at the bottom of the shaft, the layer has been followed for a distance of some 70 feet in length, in the sense of direction, and from 17 to 22 feet in the sense of inclination. At some 400 yards from the mine "Porvenir" the shaft of the "Santa Teresa" is encountered, oval in formation, 13 feet in its greater, and 12 feet in its lesser diameter, and 20 feet deep; in it there is presented one layer of coal of good quality $4\frac{1}{2}$ to 6 feet thick, which runs from NE. to SW., with an inclination of 60° to NW. In the foot wall of the layer there is presented a clay of leaden color, and on the top it is covered by a sandy clay that is found to be crossed by veins of a very solid broken limestone formation. These workings were continued without any fixed plan until the enterprise, under the prudent and intelligent counsel of Mr. Hernandez, opened a transversal gallery from the creek Napairan on a true survey in order to determine its value for exploitation, and which gallery encountered the layers transformed into small strata, so worthless that they decided upon the total abandonment of these mines in 1859.

Results.—If the labors had commenced with this latter work and before risking the capital of so much importance in outside expenses and buildings, the failure and deception would not only have been less bitter, but by a better location of the mines the coal taken out might have been sufficient in quantity to cover the value of executed works.

MINES OF NAGA.

Work was done in four places of the jurisdiction of this town. Insignificant in Sibod, at the "Rosario" mine, and in Lutac, at the "Santo Niño" mine; considerable more were those of the "San Antonio" and "San Jose" mines in Alpaco; and much more important and intelligent in the mines of Uling, the "Santo Domingo," "Nuestra Señora del Carmen," and "Purísima Concepción," afterwards included in a group under the last above-stated name.

Mine of Sibod.—As we were hardly able to notice any traces of the mouth of the fallen gallery in the work on Sibod Creek, hidden among the close foliage of those places, we appeal to the Book of Demarcations of the Inspectorate, which describes the deposit, and we find that it consists of a layer of coal with a mean thickness of 70 centimeters, running almost from north to south, with an inclination of 30° to the east.

Mine of Lutac.—Mr. Lasaña gives us some information of the mine of Lutac, in a report to the superior civil government, written in 1861: "It has," he said, "in it one layer of coal whose thickness varies between 70 centimeters and 1.50 meters;

its direction is approximately from NE. to SW., and its inclination to SE.; it is placed between a clayey schist, serving as a bed, and a layer of clay that forms the roof. The workings consist of three galleries, at different levels, of which the two upper ones have cut the layer of coal at a distance of 50 and 54 meters, respectively, and the lower one has not yet cut the deposit at all. The coal is," he said, "not coherent, and the greatest part of it comes from the mine entirely pulverized."

Mr. Centeno, who saw these works some time after the mines were abandoned, assigns to the layer (in his Geological Memorandum of the Philippines) a thickness of 1 meter, and inclined toward the NNW., connecting it with those of Sibod, and "Santa Rosa" in Danao, and declaring, besides, that its coal produced a coke of excellent quality, proved in the arsenal of Cavite. When we visited this place, besides the three downfalls, we found only a remainder of a gallery, opened in a direction E. to W., upon a conglomerate and two or three outcroppings, only one of which showed with clearness, in the very much overturned ground, a thickness of 80 centimeters in the layer, and a stratification sensibly extended from north to south, with an inclination toward the west. According to creditable information that we have acquired, the works of both mines were abandoned on account of the irregularity of the layers, and on account of the coal being so brittle that it was unable to stand transportation.

Mines of Alpaco.—Of the concessions of Alpaco we have still less facts than the former ones. Mr. Lasaña, in the same report, to which we have just referred, says: "The works are also of little importance, the opened galleries not following the layer over 20 meters in length. The thickness of this layer is from 1.50 up to 2 meters; its inclination is 40° to ENE. It is located on the brow of the mountain, and by reason of its elevated position has very little ground for exploitation under the water level." Mr. Centeno, in spite of having visited it, indicates nothing specially about these layers, and we are only able to discover, with great difficulty, several old fragments, already almost covered with vegetation, and only one outcropping disclosed by the waters of a creek, probably after those mines were abandoned, for otherwise they would have taken out all the profitable coal, as they did in the other places in the valley. That outcropping showed a direction NW. to SE., and an inclination of 50° to SW. We also know, by private accounts, that in order to take out the greatest amount of coal in any possible way, they made inclined galleries after the manner of "Las Trancadas de Almeria," in which the drainage was very soon made impossible, with the scarce means at their disposal, compelling their abandonment. This enterprise, as we see it from a mining point of view, was of very little importance, nevertheless they knew how to acquire for their own benefit all the sympathy and official protection which was conceded to mines.

Mines of Uling.—In Uling, as we have repeatedly said, the most important mining of all the island was performed, and, though we were unable to penetrate into them, because all of them were completely demolished, we saw and studied some of the outcroppings that are around them, and were able to connect them with the works that existed by consulting the plan we found in the archives of the inspectorate.

The plan referred to in the quotation above is still found in the archives of the mining bureau, and a copy of it, marked "Plate II," is attached hereto, and of this plate Señor Abella says: "As an important historical data, and above all, as a graphic description more eloquent than we could make, not having been able to visit the interior of the works, we join a copy to our present description and copy of the report of Mr. Hernandez."

Outcroppings.—But before occupying ourselves with these, and the layers which they show, we will briefly indicate the croppings that we saw in the remote villages of Campacan, Cambaji, and Cambanga. In Campacan the coal matter which we found (burned in part by the action of pyrites) presented a thickness of 1.25 meters, and a direction from NNE. to SSE., inclining 50° to WNW.; and that of Cambaji,

with a thickness of 1.20 meters, approximately, following the same direction, being inclined, however, toward the opposite or eastern section. In Cambanga, of the two nearest outcroppings that we distinguish there, the most clearly stratified one runs from NNE. to SSW., inclining some 50° to WNW., with a thickness of approximately 1.20 meters.

Workings.—Between the arroyos Nasipit and Uling two layers or veins are represented in the plan of the works cited (Pl. II), designated by the numbers "first" and "second." The first, although discovered on the surface by two outcroppings, not far distant from each other, one only has been cut in the interior by the gallery called the new "third," and this although the second goes beyond the prolongation which toward the NNE. ought to show the vein. To this fact, without doubt, the knowledge of the fault alludes, which is graphically indicated in the back part of the new third gallery, and proves that by this slope the vein terminates, or at least shows a determination of continuity.

Let us see what occurs in the opposite sense, or from the SSW.

Although when this plan was drawn the workings had only been completed which are marked on it in black lines, they were later somewhat further extended, since Mr. Centeno, in his *Memoria General Minera*, shows a length of 640 meters for the larger of the two great transversal galleries, besides giving the status of the thicknesses and qualities of the veins which are cut in it. Noted and expressed in meters, we reproduce in continuation, marked on the plan with red lines, the total length of the passage until reaching the large vein, and the position of this, not taking any account of the other strata and veins of coal, by reason of lack of knowledge of the circumstances of their lying (location).

Beginning at the mouth of the gallery there is encountered—

	Meters.
Slaty clay and sandstone, alternately	90. 76
Coal (A).....	. 55
Slaty clay and sandstone.....	20. 99
Coal (B).....	. 55
Slaty clay and sandstone.....	11. 62
Coal (C).....	. 55
Slaty clay.....	. 83
Coal (D).....	. 83
Slaty clay.....	511. 28
Coal (second vein of the plan).....	4.75

We shall quickly observe that the first vein of the plan is never cut in this transversal gallery, and that, united to that which we shall see, proves the discontinuance of this class of lyings and the small importance of this first vein.

The inspection of the status shows the existence of four veins, A, B, C, and D, which probably can be considered as three, in the supposition that C and D may be only one vein with an interior stratum of washing of slaty clay; but these veins do not appear on the surface, and some at least are not cut in the upper ventilation gallery, according to verbal statements which we acquire from one of the pit bosses of the mines.

The large vein, the second of the plan, is cut on the other hand at two distinct levels by the two small galleries which encounter it, so also by the great transversal and by the one called the second in the plan. Its thickness is the largest of those which up to this time we have found in the other deposits of the islands, taking into account also that of 5 meters, very large, which we found in the outcropping of Nasipit. On the other hand, neither toward the NE. or the SW., does there appear to be discovered any sign of such consideration that it would probably be presumed to be an extension of the large vein.

In spite of everything, the abandonment of these workings at the precise time when the great transversal gallery was cutting the large vein, without first having even attempted the reestablishment of a portion of the capital expended by excavating the 200 meters that, in the sense of slope, the first and second galleries contained, and those that, in a horizontal sense, the state of the mine would have permitted, can not be rationally explained. This fact can only be explained by a great discouragement of the enterprise, and by the fear of losing a still more considerable capital, an unjustifiable fear, matters having arrived at the extremity that then obtained.

Production in Guila-Guila and Naga.—We have no other data concerning the production of all the mines described by us up to this time, beyond those contained in the General Memorial of the Archipelago, of Mr. Centeno, who assigns a total production of 17,000 tons, in round numbers, to the mines of Guila-Guila, Uling, and Alpaco.

MINES OF DANAÓ.

Within the limits of the town of Danao, three mineral concessions existed—the “Santa Rosa” mine, at Luguayan; the “Magallanes,” at Camansi, and the “Legaspi,” at Mantija—in which the workings hardly attained to the rank of a prospect, only a small quantity of coal being taken from the first one, much better situated than the others for purposes of transportation.

Mine Legaspi—Outcroppings.—Going down toward the river Danao, by the way of the arroyo of Mantija, before entering upon the old claims of the mine “Legaspi,” we happened upon a small prospect upon the first. In this the veins show a direction from N. 10° W. to S. 10° E., inclining some 45° to the E. 10° N., it being impossible to judge of its thickness because the small gallery that exists above it, as a prospect, besides being entirely demolished was opened, and with what object we do not know, over the slope of the coal vein and outside of it, following the direction of the strata. The second, located in the place where the creek changes its direction, is discovered in the bed of this creek, with a thickness of 1.15 meters, with a direction from N. 10° E. to S. 10° W., and with an inclination of 40° to the E. 10° S.

The works.—Within the lines of the abandoned mine “Legaspi,” entirely within the bed of the creek, we found, first an indication of slight importance, and lower down upon what was, without doubt, a legal labor, a gallery entirely demolished, amid the fragments of which some pieces of coal were found. Upon consulting the proper book of the inspectorate we saw that when the survey of this mine was made this legal labor gallery had attained a length of 11 meters, and was opened in sand and clay, and following a vein of coal, 0.60 meter in thickness, extending from N. 10° W. to S. 10° E., and inclined 40° to the east.

Mine Magallanes.—In the “Magallanes” also we found in the same way two outcroppings near to each other, one of them not very far from a demolished working. According to the same book which we have just mentioned, when this mine was surveyed this working was 14 meters long, following a layer of coal 0.80 meter in thickness, with the same direction as that above mentioned, and with an inclination of 30° in an easterly direction.

Mine Santa Rosa.—In the abandoned mine “Santa Rosa,” located, as we know, on the hill Luguayan, two outcroppings are seen on the lower part of the creek of that name, and some others on the upper part among the workings that have been carried on there. Near the plain of Santa Rosa, in a natural washout of the creek bank, a small vein of some 0.10 meter in thickness is discovered between clays and limestones, inclined some 75° to the NW.; and a little farther up, on the same creek, the mouth of a small prospect gallery is seen, made upon an indication which is still noticeable from the outside, of only some centimeters of thickness, attaining in the back portion of the gallery, which is incidentally accessible, some 0.60 meter in thickness, and with an inclination of 80° to the NW. Under analogous conditions,

though of greater thickness, outcroppings are seen that exist among the workings of this mine.

Workings.—These consist of a lower transversal gallery for prospecting purposes, and of several others that were opened out upon coal, and which therefore must have been exploited. The first of these, being opened upon a conglomerate of sufficient solidity, is preserved for some 10 or 12 meters. The rest of this is entirely demolished and inaccessible, but it must have reached some dozens of meters in length, judging from the volume of the dumps which are still partially preserved. The works which must have been exploited consist of five galleries, placed one above the other in such a way that between the floor and the roof of the two, consecutively contiguous, scarcely a meter of thickness was left; so all of the exploited combustible taken out came from these galleries that to-day are entirely demolished, though still recognizable by a linear series of downfalls, which indicate in the ground the direction of the vein from N. 65° E. to S. 65° W. Judging from the coal lands that are still burning, we believe that those exploitation galleries were each from 20 to 30 meters in length. Toward the SW. of this same hill the remains of a working are still seen, older than all the former, and known in the country by the name of "Selvero," from the name of the alcalde mayor who directed its operation, and out of which the coals were taken that were sent to Manila, and that gave occasion for the first visit of Mr. Antonio Hernandez to the province.

Production in Danao.—From what can be judged of the workings described in these mines of Danao, a bona fide production was not had, although scarcely as scarce and contingent as in the former ones, and it must have been reduced to some 150 tons extracted from the galleries and for whose transportation a portion of the road to Santa Rosa was made.

MINES OF COMPOSTELA.

In the town of Compostela alone there are two adjacent mines, with the same proprietor, called "Esperanza" and "Caridad." For several years back the claims of the mine "Caridad" alone were worked, and on the claims of the "Esperanza" nothing more was done than prospecting works, consisting of a ditch or drain, the legal labor and a shaft of slight depth, but considerable width, and at present fallen in.

Outcroppings.—Not far from these works two outcroppings are discovered within the bed of the river, one of a meter in thickness, and the other, at some 50 meters distant, of 2.50 meters in thickness, with a direction from NNE. to SSW., and with an inclination of 50° toward the east. However, this thickness disappears in the shaft just mentioned, and which is opened precisely on the extension of the vein.

In coming directly up the arroyo of Dapdap, near to the mouth of Jimarco and Jinagdanan, other prospects of slight thickness are found, and with a direction and inclination similar to the former.

Passing a shaft that has fallen in, still within the claims of "Caridad," at the entrance of a creek that is parallel to Jinagdanan, two other croppings are found, almost united, and from 80 centimeters to a meter in thickness, and by its side there is the mouth of a demolished gallery of investigation.

Lastly, still near to the present workings, there are to be seen other outcroppings, which are shown in the accompanying Pl. III that we have traced, representing these. We will, then, now pass to the description of the real workings of the mines.

Works upon the western layer or vein.—Though of slight importance, we can distinguish in all the workings those that may be for prospecting purposes, for preparation, and for profit, all of them being opened upon parallel veins, whose distance is 50 meters from each other, in a horizontal sense, and extending approximately from NNE. to SSW., inclining from 30° to 60° toward the east.

Upon the most western vein, taking advantage of the unevenness of the ground,

two galleries have been opened, the lower one, for transportation and extraction, being 193 meters in length, and the other, as an auxiliary, 49 meters long, and that communicate between themselves and with the surface by three chimneys, that, according to the inclination of the vein, foot up 56 linear meters of excavation. The one, which, without passing through the upper gallery, connects the lower one with the surface, has been obstructed in order not to prejudice the ventilation. From the lower gallery, which is called the "Esperanza"—although it is made, as we have said, within the mine "Caridad"—two transversals for prospecting have been opened; that of the west only five meters, in round numbers, and that of the east, which goes through the veins of clay and sandstone which are seen with detail in the cut, of some fifty meters in length, there having been found in its back portion very provoking indications of the passage of another vein, which advised the opening of a gallery of 23.50 meters in that direction, and of an unfinished chimney of 14.50 meters, opened at a distance of 3.20 meters from the resulting cross timbers.

Lastly, between the galleries "Esperanza" and the auxiliary, already demolished almost at our last visit to those mines, some crosscuts for profit have been opened in the front, which have afforded, together with the coal of the galleries, the contingency of a scarcity of production of these mines, and it is enough to direct a glance at the longitudinal projection of these workings to be convinced of the prematurity of the exploitation, inasmuch as, without reaching a maximum of production, the laborers would be very few that could be established in the present state of the workings, and these small pieces would be exhausted before the galleries could be sufficiently advanced.

Workings upon the eastern vein or layer.—On the eastern vein, whose outcroppings are marked on the plan, and whose indications are investigated by the gallery from the east of the transversal of the "Esperanza," another gallery has been opened, called the "Caridad," which is 157 meters long and is only ventilated by communicating with the surface by means of a chimney, which at a distance of 34 meters from its lower mouth has also connected with it toward the north another gallery of direction 52 meters long. On this vein also workings for profit are made, equally as premature as those of the "Esperanza," although they reach a greater development on account of the coal of that second vein being harder and preferred by the limited consumers from these mines.

The total extension of the workings reaches to 473 meters in galleries of direction upon coal, 55 meters of fruitless transversals, and 231 meters of chimneys and narrow cuttings of every kind, or, that is to say, a general total of 759 meters of linear workings opened during a period of six years' work.

This, therefore, is at the rate of 126.50 meters per year and 10.54 meters per month, which figures demonstrate eloquently that which we have from the beginning pointed out, namely, the notable slowness and decay of the working of these mines. Though we shall point out further on that the works in general upon these deposits ought to be done in a prudent and careful way, this prudence should not go to an extreme of sluggishness, so as to be contrary to the economy of establishments of this nature and contrary to the reasonable development of the workings.

Production.—The coal taken out up to 1879 came near to some 2,000 tons, according to the data of the same proprietor, so that the average annual production has been 333 tons, or 27 tons monthly.

Conditions and accidents.—In the gallery "Esperanza" and its auxiliary the western vein shows thicknesses comprised between 0.50 and 1.40 meters and inclinations toward the ESE. that vary between 50° and 70°, there being discovered up to this time, as the only accident in all the workings, a small fault represented with full detail in the proper figures of said Pl. III.

In regard to the eastern vein, whose outcroppings are discovered near to the road from the mines, besides the obstruction that toward the south appears in the gallery

of the eastern part of the transversal of "Esperanza," there has lately been found in the back part of the gallery "Caridad" a fault of very solid clay, not brittle, and 2 meters thick, almost vertical, and with the direction that is marked out in the plan and projection of these workings. The location and dip of this vein at this point are in clay, with a little slate of the same color, so that its investigation on the other side of this accident is somewhat doubtful and difficult to determine.

Consequences.—In spite of these faults and breaks, and even of the total or partial interruption that may in the future appear, and that must be expected in deposits of the nature and age of those we are describing, its location in a territory favorably hazardous for continuing still for a certain period the workings on the slope without resorting to the most expensive ones under the level of the valleys, the cheapness of day labor wages and of timbers, and the excellent quality of the lignites that, as we shall hereafter confirm, insure its active sale in the market of these islands, and at prices sufficiently lucrative for the miner, undoubtedly advise an active working, though reasonable and cautious, without incurring in it either the exaggeration of great disbursements, many of them foreign to mining itself, such as were made by the enterprises of Uling and Alpaco, or the opposite and extreme prudence which was practiced in these mines, if the inconsistent and languishing sluggishness with which the workings were prosecuted can be called prudence.

OTHER DEPOSITS.

In order to complete all the accounts that refer to the coal of the island of Cebu, we shall give, in continuation, a slight sketch or résumé of all the outcroppings that we have had occasion to encounter in our journeyings; and though we do not pretend that the list will be complete, we believe that there will be few of those that were discovered when our journeys were made that are not pointed out in the list.

Sogod.—In the vicinity of the town of Sogod, in a creek which drains into the river Bao at that point, an outcropping, not very important, exists, and of still less importance if the locality in which it appears is borne in mind.

Catmon.—On the banks of the river Panalipan, of the town of Catman, on the head of the arroyo Ilong, located on the brow of Mount Macabungat, an outcropping of coal appears, which lies between gray and yellowish clays, with a thickness of 0.60 meter, extending from NNE. to SSW., and inclining from 30° to 35° toward the west.

Danao.—In the distant and hazardous valley of Cajumay-Jumayan, bounded on the south and southeast by the peaks Sili and Lantauan, on the northeast by Mangilao, and on the west by the central mountain chain, in the limits of the town of Danao, we have seen two outcroppings of coal, one near to the arroyo Manjubud-jubud, and the other within the bed of the arroyo Baisabais. The former is of little importance, and the coal appears in a large ditch, almost destroyed, and between clays and smooth sandstones, its direction appearing to be from N. to S., with inclinations almost vertical; and the second shows a compact coal of very good appearance, in a vein 3 meters thick, extending from NNE. to SSW., with an inclination of some 55° to the ESE.

On the other side of the arroyo we saw a small prospect in a transversal gallery in this direction, and, as a proof of the upheaval which this region has suffered, we found in the mouth of this gallery, which is situated a small distance from the outcroppings, an inclination of the veins of from 25° to 30°, instead of the 55° which we have just mentioned. Descending Cajumay-Jumayan by the footpath that leads to the small valley of Santa Rosa, the source of the arroyos Sili, Mantija, and Magliji, we saw three coal outcroppings of confused stratification, though in the first we believe there is observed a direction from NNE. to SSW., and an inclination almost vertical, with a slight tendency to dip toward the east.

Lastly, within the bed of the river Danao, near the mouth of the Camansi, four outcroppings appear, with thicknesses comprehended between 0.50 and 0.70 meter.

Compostela.—In the town of Compostela, and following the road that leads to the mines, coming down the hill which leads to the valley of Moao, a small outcropping of coal is found on the right-hand side, and lower down in the valley, and within the bed of the river Dapdap, another is seen no less insignificant. A little farther on, following the same road, and before entering upon the claims of the mine "Esperanza," there is found a small caved-in prospect in which nothing could be seen, but it was undoubtedly made upon an outcropping of some consideration.

The towns comprised between Compostela and Talamban have hardly any hilly country, so that no coal outcroppings are discovered in them.

Talamban.—In Talamban there are two that we have seen, both of them on the banks of the river Ijaiup or Parel. The least imperfect, judging from the hollow left by extracting the coal indications, employed, as we were told, for the use of the iron works of the country, is located close to the mouth of the arroyo Taptap, on its right bank, the strata of that section appearing to be in a sensible degree from NW. to SE., with an inclination of 10° to the NE., or toward the river Ijaiup; and the second one, much lower down the course of the river, here already passed from the region of the volcanic rocks, and at the place designated by the name of Macurong, appears in the shape of a small pocket, which we happened upon while gathering some samples showing its importance.

San Nicolas and Minglanilla.—Besides the indications of Guila-Guila, still in the district of Minglanilla, we saw good indications of coal rather than true outcroppings, whose locations there is no need to mention because they are stated in the list of mineral registries of the island; and, for that matter, they contain, as their only mineral, some eruptive rocks, black in color, which were mistaken for coal.

Carcar.—Of this same class is the rock that caused a registry of coal on the river Garay, of the barrio of Batsiji (Ocaña), of the town of Carcar.

Sibonga.—In the district of Sibonga, in the arroyo of Baulot, we saw some loose pieces of coal, but ascending to the source of this arroyo we found only the volcanic grounds which undoubtedly could not have produced the pieces we have mentioned, and whose true origin, therefore, could not be found out.

Argao.—Upon making a cañiñ (a clearing for agricultural purposes on the side of the mountains) some years since, on Mount Santicon, which forms the left bank of the river Argao, the entire ground commenced burning, the fire lasting some time, and so producing great cave-ins of the surface of the earth, which caused the suspicion of the existence of coal in that place. We ourselves were unable to take any account of the conditions of the deposit and its importance, because of the cave-ins mentioned above; but, nevertheless, although we confirmed its existence, the place in which it is situated is so wild and far away from the coast that it removes it for the present from the probability of exploitation, even supposing that its importance might advise it.

Dalaguete.—On the headwaters of the Dalaguete, in a steep bank called Patani, an outcropping, carboniferous in character, is seen, composed of black clay with small seams of coal, which extends almost from north to south, and inclines some 33° toward the east. In the bed of the same river, in its principal channel, several other coal indications are discovered, of very good appearance and with the following conditions of location: the first, with 0.25 meters of thickness and many strata of slate, extends from north to south, inclining some 45° to the west; the second extends from N. 20° W. to S. 20° E., almost vertical; and the remainder, belonging to a deposit exposed by the same bed of the river, crossing it from shore to shore for some 30 meters in length, have 0.45 meters of thickness, and extend from N. 25° W. to S. 25° E., and incline from 50° to 60° to the S. 25° W. These deposits are always found lying between beds of clay.

Boljoon.—In the barrio Becerril, of Boljoon, we have seen two outcroppings, on one of which, situated at the place called Bairan, on the right slope of the glade of

of Lamuño, workings for investigation were made, which, having fallen in, made it impossible at this day for us to appreciate the conditions of the deposit, though in the neighboring clays there is observed a direction of from N. 15° E. to S. 15° W. In the other, located on the opposite bank, the deposit shows a thickness of 0.80 meters, a direction almost from N. to S., and an inclination of 35° to 40° to the west.

Malaboyoc.—On the river Inamblan, of the district of Malaboyoc, at the foot of a hill called Cabagaquian, there appears an indication of 0.15 meters thickness, which runs from NNE. to SSW., inclining 15° to the WNW.; and to the west of this point, in the depression that exists at the union of this hill with Mount Lanaya, another one is likewise discovered, which appears to belong to a different deposit.

Alegria.—On the river called Bombon, of the barrio of Guinanon, district of the town of Alegria, various coal croppings are discovered, with characteristics of location very little accentuated, but which appear tending from NE. to SW., with a slight inclination to the SW. The coal is very similar to that of Boljoon in its exterior characteristics.

Toledo.—In the district of Toledo, the old town of Jinolauan, coal appears in two places; one, of very little importance, in the river Ungun, composed of small lignite veins between clays and limestones, with a direction NE. to SW., inclining some 35° to the eastward; and the other, more important, in the arroyo Actiue, 3 meters in thickness, with the same direction as the former, but with an inclination of 45° toward the NW.

Balamban.—Lastly, in the place called Maulincop, of Balamban, a small strata of very little importance and very gray coal is discovered underneath a limestone and upon a bed of clay.

QUALITY OF THE COALS.

Mineralogical description.—The coals of the island of Cebu can be classified, mineralogically, without any kind of doubt, as *Lignitos piciformes*, among which there can also be found varieties of those which Dufrenoy called *comunes y destruidos*. In fact, except some dirty and semidecomposed samples, whose condition depends rather on the exterior agencies that have worked upon them, it can be said that in general they are black and more or less brilliant, sometimes very similar to true jet; of unequal and conchoidal fracture, and in fresh samples quite hard; some, such as those from Guila-Guila and Alpaco, slightly pyretic, and others, such as those from Compostela, with small gypseous veins, which must result from the decomposition of the pyrites by water charged with carbonate of lime; of compact texture and a structure almost woody, indicated by concentric zones owing to the successive layers of the growing of the timber, with rays, and above all more or less gray powder; and with densities ranging between 1.25 and 1.40.

Laboratory assays.—In regard to their properties for practical and industrial application it is known that they depend principally upon their composition and their manner of burning in the air, for which reason we shall state our own and the foreign studies and observations such as we have been able to gather about these matters. The first laboratory assay that was made of the coals from Cebu dates from the year 1853, and was executed by order of the members of the executive board of mines at the school of engineers of the department. The samples coming from Guila-Guila were subdivided into three classes or sections and gave the following results:

	First section.	Second section.	Third section.
Specific gravity.....	1.14	1.10 to 1.22	1.30 to 1.46
Ashes per 100.....	6	11	18
Coke produced per 100.....	60	58	56
Volatile matters per 100.....	40	42	44
Caloric power.....	5750	4860	4200

The samples of the three sections burned with brilliant flame, very prolonged. They did not contain pyrites in a notable or prejudicial quantity, and they all formed a kind of faded black coke.

(Here follows the statement of two assays relating to the coals of Uling and Alpaco, a translation of which will be found under the heading, "Assays of this period," on page 41 of this report.)

On our part, we also made like assays in the laboratory of the inspectorate with the samples gathered in our first campaign, and besides others taken from the two classes of foreign coals that were sold in the markets of Manila, under the name of the English and Australian coal, in order to compare their power under like conditions the one with the other, deducing therefrom which of them was the most profitable for employment, and which was of lower price in producing heat, bearing in mind the current prices of that time.

In the table that follows the results we have obtained, exactly compared, are contained, and in it we include also those samples from Maulincop and Danao, taken from outcroppings more or less decomposed, not for deducing the general importance of its composition, undoubtedly altered, but as a notable sample of its relative purity in spite of the unfavorable conditions under which we selected them.

(The table referred to in this paragraph is Table III.)

The careful examination of the results that this table presents permits us to deduce:

First. That in general all the lignites that we are considering are of excellent quality, very rich in fixed carbon, scarce in ash, and with very high caloric power, coming from grounds relatively so modern.

Second. That in spite of these advantageous properties, their very modern origin is understood, and in a certain way confirmed also, by the condition, essentially hygrometric, that they present and which gives to them a certain resemblance to the vegetable combustibles separating them entirely from coals and anthracite.

Third. That all of them are of very good application for combustion in the fire-boxes of steam engines, both on account of the facility with which they blaze with a flame, and because of the important condition of not choking up, neither giving off a very heavy smoke nor producing a great quantity of ash.

Fourth. That in this conception the lignites are almost superior to the coals from Australia, inasmuch as their caloric power does not differ much and

Fifth. That the English pit coals are very superior to these coals, but not with the difference that would be supposed, their respective locations being kept in mind.

Comparing besides these results with those obtained upon the samples of coal from Guila-Guila, Uling, and Alpaco, recently mentioned, we find ourselves with figures very similar, except in those of the ash produced in very considerable quantities, above all in the coals from Alpaco and Uling, and which we can assume is from the bad preservation or quality of the samples sent to Madrid.

(For continuation, see page 202 of Appendix A to this report, commencing with the words, "Steam-making power: In order to prove," etc., and continuing to the words, "price which will overcome the difference in quality," on page 203.)

Comparison of commercial prices.—With the object of proving this let us compare, under like conditions, the prices of all the foreign coals, taking for this purpose the real value of a million of physical units produced by the combustion of the English and Australian coals, supposing the mean price per ton to be 11 pesos for the first and 9 pesos for the second.

We shall have in this manner:

$$\frac{1,000,000^{\circ} \times 9 \text{ pfs.}}{1,000^{\circ} \frac{2}{3} 6,205^{\circ}} = 2.47 \text{ pfs. for Australian coal,}$$

$$\frac{1,000,000^{\circ} \times 11 \text{ pfs.}}{1,000^{\circ} \frac{2}{3} 7,530^{\circ}} = 2.19 \text{ pfs. for English,}$$

and taking from the two values the lesser or cheaper, we deduce for like price in the coals of Compostela that—

$$2.17 = \frac{1,000,000^{\circ} \times P}{1,000^{\circ} \times \frac{2}{3} \times 5,643^{\circ} \times 5,829}; \text{ or } P = 8.30 \text{ pesos per ton.}$$

Consequently in normal conditions of the market at prices less than 8.30 pesos per ton, the use of the native coals results as much more favorable for commerce and for the competition that can be made by foreign coals as it is more separated from it.

This fact is very important, and miners ought to keep it ever in mind when proceeding to determine the cost of exploitation of their coals and the profits which can be obtained; and then they ought not to lose sight of the indispensable limitation in the selling price and the propriety of keeping it lower in order to render the aforesaid competition more effective.

(For continuation of this article see page 203 of Appendix A to this report, commencing with the words, "Tests in the Navy. In order to include and unite," etc., and continuing to the words, "up to the present time prove conclusively the excellent quality of the coal," on page 206.)

GENERAL CONCLUSIONS.

Concluding with a résumé, expressed in a few words, of all that we have stated, with full details concerning the coal deposits of the island of Cebu, there results: That, although the deposits certainly appear at a multitude of points, located along the length of the mountain chain, and taken together occupy a great extension in the island, there ought not on this account to be attributed to them an exaggerated importance which makes them in any respect comparable to the pit-coal fields with which they have been unfortunately confused; since as lignite deposits of very recent age, that moreover lie in a region that besides its recent age is very much overturned by the eruptions it has experienced, they present general characteristics of irregularity and discontinuity proved in practice wherever it happens that the workings have been followed with any consistency. In their exploitation, then, that uncertain character peculiar to them must be taken into account, and care must be taken, therefore, not to employ in the first installments the capital of importance, multiplying instead within each working region the points of contact for the investigation of the layers (veins) and the preparation of each profitable deposit with the object of counterbalancing the scanty with the plentiful, and so obtaining in so far as it is possible a constant and regular production in each exploitation.

On the other hand, the cheapness of day wages and of timbers for props, so necessary in all mining operations, the facility in most cases of executing the exploitations above the level of the valleys, at least in the first and more difficult period of the workings, cheapening considerably the general interior services, the undoubted and excellent quality of these lignite coals for different uses, and more especially for combustion in land and maritime steam engines, and lastly the price at which they could be sold in the market, with sure sale and legitimate and sufficient profit for the miners, without possible competition, because the foreign coals will always reach higher prices, not only absolutely but even in the true relation of their caloric qualities, constitute such other advantageous conditions and qualities as can not be found everywhere, and which, in a certain way, counteract the geological character of their formation, which, to say the truth, diminishes the importance that some with ready celerity had attributed to them.

But then it may happen that it will be asked why these deposits have not been exploited, or are not exploited permanently? Is it because the trials of the working of the mines attempted up to the present time have generally produced such deplorable results?

There are various causes, and we are going to show the principal ones, even though

we have to recall painful memories, that contain, however, useful instructions concerning an experience which should never be forgotten. All the mining enterprises of Cebu commenced their works with a truly exaggerated enthusiasm, as if nourished by the belief that they controlled inexhaustible deposits which could furnish coal to half the world; and this belief they saw on the other hand confirmed by the declarations of the English engineers of our navy, who so asserted at the sight of the mines, and also confirmed in official reports proceeding from the navy, which we have before us, there being added to them that the deposits and the coal were identical with those of Newcastle and Cardiff; in the meantime, on the contrary, the prudent indications or counsels of some, although a few competent persons were not listened to, and among those we ought specially to mention the very distinguished engineer, Mr. Hernandez.

The capital, then, was spent without measure, with the certainty of obtaining incontrovertible and very large profits, and although, to say the truth, the capital was not being employed in mining properly so called, but in expensive outside installments and in roads which inevitably and fatally the enterprises were compelled to build (roads not existing then, as they do not exist now); when the realization of the results of such conduct came to put in evidence the absurdity of the system that they had undertaken, then the discouragement was, if possible, greater and not less unjustified than the first enthusiasm, and it may be seen by the Uling enterprise, which was the most powerful of all, in selling their materials at a sacrifice, and, seized of an inconceivable dismay, abandoning the mines just when the larger layer (vein) was assuring them of an undoubted production by a certain extension which might at least have restored the capital employed.

Excessive enthusiasm at the beginning of the enterprise, and vehement and inconsidered dismay and abandonment when the difficulties of every new business presented themselves, and, above all, the fatal and unavoidable embarrassment of transportation are, then, the culminating causes which produced the deplorable results which have been just observed in the coal mining in the island of Cebu.

Laying to one side the difficulty of the general transportation—which the State or province should decide upon by constructing them if, upon the discovery of the coal deposits, their geological characteristics as to age and deposit had been studied carefully, and so, understanding that it treated of nothing more than lignites, yet, on the other side, excellent for the uses that could be made of them in the archipelago—the works could have been established on the basis of the moderate foresight which for such deposits the science of the miner points out, there is no doubt that these exploitations would have been secured, and, after twenty-seven years of existence, could have presented to-day in the markets of the islands all, or nearly all, the combustible they require without possible competition in prices as the result of those not very extensive but numerous exploitations which could exist in the island of Cebu.

We can adduce many examples of similar deposits among those that are producing relatively great amounts of combustible of modern origin. In America, Australia, and in Europe great quantities of lignites are exploited with great advantage both for miners and consumers. Spain has produced nearly 39,000 tons in the year 1881, according to the last official statistics which we can consult; Russia has raised the production of this same combustible to more than 15,000,000 tons yearly; Italy, which is found in the same situation as the Philippines, without containing in her soil even a single deposit of pit-coals, exploits with eagerness those lignites which she possesses and produces nearly 100,000 tons yearly; and the Philippines, where the coal industry has received numerous official protections, born, as we may say, under the impulse of it (since by official action the first discoveries and accounts of its coal deposits were given out), does not produce, notwithstanding, more than some

few tons of that important material, and those in a laborious, weak, and inconsequent fashion.

It is necessary to acknowledge it; all the official efforts have been in vain up to the present to enliven this industry, because at times they invested in them with a character irritating by its exclusiveness; and at other times they quenched with good but officious desires that liberty of industrial action which if it is necessary for all kinds of business, is still more so for those that relate to mining.

The true and only mission reserved to the State, in the support of the mining wealth, was almost always forgotten, which is not other than that of studying scientifically and industrially the mineral wealth of the soil, in order that private industry by the knowledge of these studies may be able to calculate, and with prudent foresight invest its capital, and that of making easy these exploitations by constructing the roads for necessary transportation, not only for the development of mining exploitations, but for the welfare and improvement of the territories that they cross.

Fortunately this kind of support, more indirect but not less beneficial, has begun to be realized by the rational and scientific study of the soil and of the mineral deposits in the Philippines, avoiding with it the confusions and exaggerated hopes, born in the heat of mistaken belief, that there may exist pit-coal banks and that it was also to be expected that, when the necessities increased and the wealth and culture of the country demanded it, there would be constructed necessary roads for transportation.

Then the like development of industry and commerce and that of steam navigation will demand a greater amount of combustible, and oblige them to think anew upon the exploitations of the coal deposits in Cebu, without incurring the old errors which on the one side the experience and on the other side the facilities of the associated means, and the mining geological science, will have entirely done away with.

CHAPTER XI.—THE MINING ENTERPRISE “LA PAZ,” IN ALBAY, 1873-1880.

In the preceding chapters we have brought the coal mining industry of Cebu down to the end of the year 1886, so far as it is necessary for the general purposes of this report. This brings us to the organization of the Company Nuevo Langreo, whose mines and workings in Cebu were located in 1887, and the specific treatment of which will be found hereafter in the history of coal mines in Cebu, commencing with the year 1887.

Our old acquaintance, Francisco Villaseñor, apparently unaware of the enactment of the code of 1867, presented a petition in July, 1873, prepared under the code of 1846, for a coal mine in Tayabas, which he describes as a discovery made by him in the mountains of the barrio of Aquirin; it was returned to the alcalde mayor of Tayabas, and no further record of it appears. We have been unable to learn anything about this alleged discovery.

During the year 1874 five petitions, drawn under the code of 1846, were presented for coal mines at Tubajon and Mabua, on the island of Dinagat, province of Surigao. They were returned for procedure under the code of 1867, and no further record is found of them. A petition presented in 1877 for a coal discovery on Mount Malolod,

island of Polillo, in the province of Infanta, was disposed of in the same manner. In 1879 the petition of Rafael Herrera for one claim at Tagakag, on the island of Dinagat, reached the point of an application for demarcation, when, on July 20, 1880, it was canceled by the voluntary renunciation of the petitioner.

All the other entries of this period belong to the province of Albay, and while a considerable amount of them were demarcated, all were abandoned without the issuance of a concession. They were distributed as follows:

Island of Batan	19
Sugud (Sogod).....	8
Gatbo	7
Total.....	27

embracing 120 claims, or 18,000,000 square meters.

These entries in Albay were largely in the interest of a coal mining company organized upon the basis of a stock company, encouraged by the governor-general and the Supreme Government, and that has gained, under the title of "La Paz," a conspicuous position in the history of coal mining in the Philippines. Its operations were originally on the Sogod deposit, in the subdivision of Bacon, and its operations were subsequently extended to the neighboring island of Batan. These mines were abandoned, but the deposits of Batan will appear again in the history of the closing period of Spanish sovereignty, commencing with the year 1890, other parties having taken them up and obtained concessions thereon, some of which are still uncanceled upon the records, and many of which had not proceeded to the extent of a concession or the granting of a title.

While Isaac Con-ni was attempting the manipulation of the government for the construction of highways and tramways to connect his mines with the coast, and to secure a contract to supply the navy with coal at reduced rates in exchange for state aid, the "La Paz" company was also busy in the province of Albay in securing or attempting to secure state aid and assistance for its adventures. There has been preserved in the Mining Bureau archives elaborately prepared prospectuses and documents, reports, and other papers, including maps and plans, and which contain valuable information that may be properly considered in connection with existing claims and mining rights attempted to be instituted on the same deposits.

The "La Paz" is found in December, 1874, representing to the governor-general that it proposes to enter upon the exploitation of its recently acquired coal mines in Albay on a grand scale; that it comprehends the necessity of having the works done under the direction of a skilled engineer, not only to insure a successful outcome for the association, but principally to insure the safety of the workmen to

be employed; that having in mind that the failure of the different coal-mining industries has been due more to the lack of skilled direction than the quality or quantity of the coal; that the development of the coal-mining industry is of national importance and has been promised the full protection and assistance of the Government, and the lack of skilled engineers in this country, thereupon it asks that the superior Government allow the association the services of José Centeno, chief of the inspectorate of mines, for one year as resident engineer in charge of their works. To this petition the chief engineer added a statement that the business of his department was not pushing him, and that inasmuch as similar aid had been given to the copper mining company in Lepanto, and the development of coal mines was of great national interest, he recommended the granting of the petition. The director-general of civil administration, after a general demurrer against the precedent of the State furnishing engineers from its supervisory department of mines for private companies, also recommended it. The governor-general, on February 5, 1875, issued the necessary decree, subject to the approval of the supreme Government, and subject to an immediate termination of the services in case it was disapproved. On February 18 the chief engineer announced his departure under this decree, the department of mines being left in charge of his chief assistant. On April 26, 1875, a royal order was issued approving the loan of the chief inspector until February 5, 1876, on condition that on or before that date the association should provide itself with an engineer on its own account. In September, 1875, the association was found again asking for one more year, and on April 10, 1876, the royal order of that date extended the period to December 31, 1876, adding thereto the condition "positively for the last time," Señor Centeno in the meantime having been retained at the mines by a provisional order of the governor-general. The irrepressible managing director, on May 16, 1876, presented another petition asking the repeal of the condition. This, too, was granted, but on January 1, 1877, the engineer returned to his duties in the inspectorate. On June 13 of that same year, under direction of the governor-general, he again returned to the mines to superintend the mining of 150 tons for tests on a large scale in the navy. This resulted in a report, which will be found hereafter.

In August, 1875, the association raised the question of the right of the company to use timber from the public lands in its mining enterprise without the payment of a tax thereon. This was based on articles 60 and 81 of the code of 1867, which makes the miner a citizen of the community where his mine is located, so far as relates to communal advantages of water, wood, timber, pasture, etc., for his own use. The opinions of the inspectors of mines and mountains were diametrically opposite, the former claiming the free use of timber for all pur-

poses, including the timbering of mines, and the latter contending for a free use for domestic purposes. The opinions are very long, and the council of administration was called into the contest for its opinion, resulting in April, 1876, in a compromise decision, the usual result of such contests, by which a provisional order was issued allowing the "La Paz" association the free use of such timber as the skilled engineer in charge (José Centeno, chief of the inspectorate of mines) should decide was necessary, and the entire question to be referred for decision to the Supreme Government, the association to indemnify the treasury for the remitted tax by paying it in case the decision was adverse. The "La Paz" association received then a favorable decision, as usual, but not without a struggle. This question of the free use of timber in mining will again be raised in these islands, and the documents referred to herein contain many useful suggestions upon both sides of the question.

The governor-general took a great interest in this association, which he manifested in many ways, as has already been seen by the extraordinary proceeding of sending the chief engineer of the inspectorate of mines to Sugud to act as supervising engineer of a private enterprise, keeping him there in that capacity from February, 1875, to January, 1877, and then sending him back again in June of that year, ostensibly to superintend the mining of 150 tons for naval tests. But that was not all. He interested himself in securing, at least indirectly, subscriptions to its proposed increased capital stock, and in every other way possible. In the exercise of his special prerogatives, in the fall of 1876 he commissioned the eminent engineer, Ramon Marty, to visit the mines and make a report on the mines. This was done, and in October, 1877, the report was made, and the association published it and used it to boom its sale of stock. Now, Ramon Marty was not connected with the inspectorate of mines, and it would seem that Engineer Centeno was not consulted about this matter, and the publication of Engineer Marty's report and the use made of it seems to have been not only a surprise to Centeno, but also a cause of offense, for he is found complaining to the director of civil administration because the province of the engineer of mines has been invaded by a member of the corps of national engineers attached to another branch (the military branch) of the service. The latter official replied that it was certainly within the province of the governor-general to employ any agency he desired, and that even if it was not it was quite certain that it was beyond the province of the chief engineer of the inspectorate of mines to criticise the actions of the governor-general.

The report of Engineer Marty was published simultaneously with a prospectus of the association soliciting subscriptions to its new shares, dated December 15, 1877. It would seem, however, that the

association did not purpose to trust entirely to the chance of securing an increase to its capital stock by popular subscription, for a memorial, dated December 1, 1877, was presented to the governor-general proposing that the administration subscribe for shares from the public charities and local funds. Other petitions and propositions followed, all looking toward government aid, and showing conclusively that it was the public purse rather than private funds, invested and to be invested in the enterprise, that were relied upon by the association. As might be expected, an enterprise that we know from subsequent examination and discovery was located upon an extensive and valuable deposit of coal, met with failure for want of funds. It seems strange to us at this date that the men of that date did not understand that "It takes money to make money," and this axiom is true of mining in the Philippines to-day, as it is elsewhere.

We translate from the records of "La Paz," as found in the mining bureau, the following pages, and the careful reader will find in them many valuable suggestions:

PETITION OF DECEMBER 1, 1877—SUBSCRIPTIONS FROM PUBLIC FUNDS.

Don Zoilo Y. de Aldecoa, managing director of the coal-mining company of La Paz, with due consideration has the honor to show unto your excellency—

That upon the arrival of your excellency in these islands, among the first things which attracted your attention was the necessity of the exploitation of the mineral coal deposits contained within the country, with the object that the industries and steam navigation might receive the impulse that the cheapening of combustible would naturally give them; producing in the development of the general wealth, the powerful influence which the rapidity and economy of trade exercises, and more especially in a country which, by reason of its being composed of islands and of navigable rivers, can not dispense with steam navigation.

Neither was it concealed from your excellency that for exalted political and economical interests of the State, besides, to be liberated from the ruinous tribute which it to-day pays to foreign nations for the importation of coal would be desirable; the navy and merchant marine being submitted to a dependency which a patriotic spirit must endeavor to cast off at the cost of any sacrifice.

Your excellency, finding that works of considerable importance upon a rich deposit of good mineral, and under favorable conditions, had been executed by this association, whose capital stock was almost exhausted without having attained their object, by reason of having been deceived in their calculations, by the circumstance of having to employ laborers, inexperienced and unskillful in the most intelligent methods, very properly deemed that its organization did not meet the exigencies of the enterprise, and in your desire to be of service for their advancement, in order to realize your patriotic thought, expressed the idea that the association should reorganize, increasing its capital stock by means of the admission of a greater number of shareholders, a method that would permit the encouraging of the spirit of enterprise in a country which needs it so much, if the business gave the results which its appearances promise, and evade heavy and appreciable losses of capital if the hopes founded upon it be frustrated.

The shareholders hastened to adopt your excellency's idea, recognizing its excellence, and the issuance of the new shares took place accordingly, the enterprise

adopting an anonymous character in order to better facilitate their placing, which is being carried out under the auspicious protection which, inspired by the aforesaid considerations, your excellency has deigned to extend to this association.

The lack of capital has been the cause of others having failed heretofore in the exploitation of the mines, and that precedent, coupled with the timidity which always prevails against undertaking an unknown business, it is to be feared, will influence unfavorably the attempt to unite the necessary elements in order that the enterprise may receive that impulse which is required for the exploitation of the mines on an appropriate scale, the country and the state meanwhile being deprived of that benefit which they are entitled to receive from them. Nothing would be more effective in stimulating the subscription of capital than the example of the public administration. In that they would see in it, besides a secure guaranty, that an impossible ideal would not be attempted; and in this behalf, having in mind the nature of the assistance which the superior authority of the islands extended so opportunely to the organization of the present bank, which brings so many benefits to commerce and the shareholders, directing that the public charities and local funds should contribute with their capital, the company has concurred in forwarding to your excellency this attentive and respectful explanation, which I have the honor to confirm in a—

Prayer that, if it be not inconvenient, there be invested in this enterprise a part of the aforesaid local funds, which are those called upon for the realization of the development and progress of the public wealth, by such means as may be considered conducive to that end by the authorities administering them, for nothing can be more favorable to agricultural production and to the industries and commerce of the islands than providing them with coal at a low price, etc.

Manila, December 1, 1877.

ZOILO Y. DE ALDECOA.

On December 2, 1877, this petition was referred by the director of civil administration to the inspectorate of mines for an urgency report upon the proposition and especially upon the mineral wealth of the deposits of Sugud and the future that its exploitation might offer. The report of the chief engineer, Jose Centeno, was submitted some time in the same month and is as follows:

REPORT OF THE ENGINEER OF THE INSPECTORATE OF MINES, DON JOSE CENTENO,
DATED THE — DAY OF DECEMBER, 1877.

THE CORPS OF MINING ENGINEERS,
District of the Philippine Islands.

MOST ILLUSTRIOUS SIR: Don Zoilo Y. de Aldecoa, managing director of the coal-mining society called La Paz, in the document that precedes, petitions his excellency the governor-general, that the public administration, in a manner resembling that which has been done in the case of the Spanish-Filipino Bank, may be allowed to invest a portion of the local funds in the exploitation of these mines. The petition is founded on the idea that has been expressed to the society by his excellency, the governor-general, for the reorganization, giving greater augmentation to its capital stock by the admission of new shareholders, not only with the aim of developing the exploitations on a grand scale and to make progress against those misfortunes which may be presented, but also to diminish the individual sacrifice of the shareholders in the event of a disastrous termination; and an idea so advantageous having been accepted by the association, it might happen that the sad examples that former enterprises present, by reason of there having been a lack of sufficient resources, and the lack of confidence that capital has in every new business in a country such as

this where such safe and lucrative employment can be given it, might be so many other causes for delay on the part of capitalists, and might hinder therefore the projected reorganization, if there be not presented, as an effective stimulant, the interest that the State with its guaranty of certainty, takes in the enterprise.

It has pleased your excellency to ask advice from this inspectorate upon the extreme measures which said instrument contains, and especially information about the mineral richness of the deposits of Sugud, and the future that its exploitation might offer; and in compliance with this decree the inspectorate has the honor to present to your excellency the following account:

The undersigned inspector, being authorized by the supreme government, in order to make plans for and direct the mineral workings of Sugud from the foundation of the society until the 1st day of January, 1877, and commissioned afterwards in June last by his excellency, the governor-general, to superintend the extraction of 150 tons of coal from these mines with the object of making tests in the vessels of the navy, the data that he has the honor to present to your excellency refers only to the time of his last visit, that is to say, to the month of July last past, ignoring, as he has no knowledge, the workings that since then may have been possibly made.

At 2 kilometers to the southeast, approximately, from the visita of San Esteban, in the jurisdiction of the town of Bacon, the first outcroppings of combustible are encountered, the places discovered by the erosive action of a small arroyo called Panogsogon. These outcroppings, prospected by excavations opened from above at various other points to the south and north, established the existence of a strata of coal from 4 to 8 meters in thickness, with a direction of N. 20° W. to S. 20° E., and with an inclination almost vertical.

Upon the creek Camaroon, at a distance of about 2,000 meters to the south of Panogsogon, two other outcroppings were discovered, located upon distinct veins whose directions and inclinations were approximately equal to the first, it being supposed that one of these may be the continuation of this last one.

Upon these data, petitions for registry were presented by various individuals to the government of Albay, that resulted in the demarcation and concession of 20 *per-tenencias*, contiguous to each other (see Pl. IV), that were subsequently acquired with due legal formalities by the coal-mining association La Paz, legally organized in Manila. This association recently has also presented in the government of Albay some new registries of coal on the island of Batan, whose expedientes are in course of procedure at this time.

A beginning was made on these works under the direction of the undersigned, in the neighborhood of Panogsogon Creek, by opening vertical shafts upon the strata, which were afterwards connected by means of a gallery of direction, and by a preparation also of an exploitation that ultimately should be made by a system of horizontal cuts of the most convenient location, exposing the condition of the location of that deposit.

At the same time there was commenced exterior works, such as a tramway that unites the mines with the sea, a wharf or pier for embarkation at the port of Sugud, which has a depth of 4 fathoms; buildings for employees, storehouses, etc.

These works, finished in the greater part at the beginning of the present year, lacked only some meters of excavation in the galleries in order to connect the shafts at a depth of 25 to 30 meters, and to give a commencement to the mining of coal in the first shaft.

At that date the period of authorization allowed to the undersigned for directing these works was terminated, and he returned to Manila, leaving, however, the necessary instructions for the employees of the establishment for the continuation during his absence, which lasted until the month of June, the time at which, as has been hereinbefore stated, he was commissioned by his excellency the Governor-General to take from these mines 150 tons of coal for a test.

During this last visit to this establishment, the communication of the shafts San Jose, Santa Julia, San Juan, and Aldecoa was completed, comprehending an extension of the subterranean labors of 230 meters, and a commencement was given to the works for benefit by connecting the shafts Santa Julia and San Jose by a system of horizontal cuts, there having been taken out in a few days from the commencement of the cuts 200 tons in place of the 150 that had been asked; and commencing at the time of my departure from the establishment, on the 15th of July last, a regular course of exploitation with a small daily production of 12 tons, that, however, should have been increased according to the measure that they opened new cuts.

The following table, with the map which accompanies it (see Pl. V), prepared by the undersigned engineer, will give a more exact idea of the workings of Sugud than any minute description that would make this report diffuse:

Class of labors.	Dimensions.			Observations.
	Length.	Width.	Height.	
Main shaft.....	4.50	2.50	24.00	On wall of the vein.
Auxiliary shaft.....	1.20	1.00	23.00	On roof of the vein.
San Jose shaft.....	2.50	2.00	34.00	On wall of the vein.
Santa Julia shaft.....	2.00	1.50	22.00	On vein.
San Juan shaft.....	2.30	1.80	27.00	On wall of the vein.
Aldecoa shaft.....	1.50	1.50	30.00	On wall of the vein, almost in contact with it.
First gallery of the San Jose at the principal shaft.	1.28	1.70	2.00	Trapezoidal section and the width taken at the middle of its length.
Second gallery of the San Jose to the north.	40.00	1.70	2.00	Do.
Second gallery of San Jose to the south toward the back part to the south of the Aldecoa.	1.93	1.70	2.00	Do.
Cuts of Santa Julia to the south....	15.00	Variable.	8.00	In coal.
Cuts from the first chimney of the San Jose to the south.	8.00	Variable.	6.00	Do.

From here it may be adduced, most illustrious sir, that the works having been commenced in February, 1875, the association of La Paz has created in a little more than two years an important establishment that commenced to give, in July last, signs of life and of a brilliant future not far removed, since a small increase of 8 tons daily over the 12 which the first days had produced (an increase easy and safe with the opening of new cuts) would have been sufficient to produce, in twenty-five working days of the month, 500 tons, that, sold to the ships at \$4 at the coast would have produced \$2,000, by which they could scarcely cover the monthly working expenses of the establishment, in which there are comprehended not only the works for production, but also those for advance in order to prepare new labors more extensive and deep, so increasing the production as to insure a continuously active exploitation.

It is certain that in this first shaft it will not be convenient to take out the bulk completely, but to leave a superficial zone intact throughout its entire length in order to avoid depressions on the surface, and in order to respect completely that portion next to the creek Panogsogon for a length of 30 or 40 meters, so as to place the laborers in shelter from the abundant filtrations that are produced in the rainy season and originate from this creek. But by all means there should always be given an exploitable zone of sufficient length and height to sustain a small production daily of 20 or 25 tons for three or four months, in which time they would be able to make preparations for the new bulks lower down.

In reference to the amount of capital, there was invested in this establishment up to July last, according to the balance of the 30th of June, the sum of \$93,140.97, in which there is included the original expenses in the first attempts before the society was constituted, as well as the corresponding expenses in the acquisition of the mine

India, which amounted to the sum of \$15,609.08, which, subtracted from the above figure, reduces the amount which represents the true investment for the works carried on in Sugud to \$77,531.89.

This, then, was the state of this establishment, described at as great length as is possible in an account asked for by your excellency with such urgency. The society has, however, in its possession a memorial compiled not a great while ago by the undersigned, in which there can be found, if your excellency may deem it necessary, more details than those which appear in this account.

It results then, illustrious sir, that the mining establishment of Sugud, as well as on account of its advantageous situation in the neighborhood of a port sheltered in all the monsoons, with sufficient depth for vessels of large tonnage, to which it would be possible to carry the coal from the mines by a tramway already completed, as well, also, as on account of the favorable auspices which the deposit presents in a depth of 40 meters that the shaft Aldecoa reaches; as also on account of the good quality of its coal, which, tried time and again by the navy and merchant marine, has given results completely satisfactory, which raises it to the height of good coal from Australia, with the advantage over that of its being cleaner and of a more perfect combustion; also, finally, because of the state of advancement and good order in which it carries on its work, it is from all lights worthy of a decided protection on the part of the Government, first interested economically and politically in that the Spanish navy and industries in these distant parts may depend upon its own elements of life and cheapness, and see themselves free from the onerous tribute which they pay to foreigners, and which considerably retards its development.

In regard to the form in which this protection should be given, either by direct aid from the funds or by timely measures which guarantees, to a certain extent, the capital that is invested, or by laws, wise and liberal, which will raise this industry by means of favorable conditions for its development, is a matter essentially one of political economy, whose resolution can not be determined by this inspectorate, having full confidence in the competency of the other departments of greater authority.

Manila, — day of December, 1877.

JOSE CENTENO.

PROSPECTUS OF THE "LA PAZ."

[December 5, 1877.]

On December 4, 1874, there was created an association, in accordance with a public writing executed before the notary Don Francisco Hernandez y Fagarines, for the exploitation of the mineral claims which were owned by the peninsular lawyer Don Juan Manzano y Vazquez, in the place called Pansogsogon, neighborhood of Gatbo, municipal district of Bacon, in the province of Albay.

Without special name or designation it was distinguished by the location at Manila of its main office, and was constituted with a capital of 60,000 pesos, divided into 1,000 transferable shares. Of these, 800 were paid up and 200 remained unissued, which latter the first proprietor reserved as the purchase price of the transfer to the association of the above indicated mining claims. Some time afterwards it was proposed to Mr. Manzano to purchase these 200 shares for the sum of 15,000 pesos. The proposition was accepted and the association was definitely established with 1,000 paid-up shares, and with the same rights and obligations.

On October 25, 1875, the enterprise increased its holdings by acquiring the mine named "La India," belonging to Messrs. Berches and Figueroa, of the commercial community of Sorsogon, which had been transferred to Messrs. Findlay, Richardson & Co., and the association acquired this from these gentlemen for the sum of 3,000 pesos, which was evidenced by the execution of the proper legal writings.

Finally, in the month of November last past, they have legally acquired the rich

deposits of Batan, an island situated in the Gulf of Albay, a few miles distant from the port of Sugud.

As soon as the association was formed, the direction of the works was intrusted to a reputable mining engineer, whose plan of exploitation was unanimously approved by the shareholders.

Without resorting to the extraordinary measures for which he had been authorized, the director found in the honest inhabitants of the province sufficient elements for realizing his proposals. From two to three hundred Albayans voluntarily assisted in the demand for the works for day labor, whom the novelty did not terrify nor the danger discourage. Thanks to their natural docility and cunning, and to the intelligent direction of the engineer, they who had dedicated their whole life to the use and cultivation of abaca were quickly converted into skillful miners.

Shafts were opened and galleries constructed according to the prescriptions of the science and the conditions of the deposits. A tramway, commencing at the mouth of the principal shaft, was planned and completed, extending into the sea, by means of a mole, to a depth of 7 meters. To the encouragement of the new industry the families of the workmen assisted and behind these the small tradesmen, and very soon there was seen to arise on these desert shores, under the protection of this great leading cause, a city, clean and elegant, which will be in time, and at no distant day, one of the most beautiful and important of the Pacific coast.

The slight consistency of the grounds in their upper strata made it difficult to construct cuts to take out the mineral, and it was made clear to the enterprise that more time and capital would be necessary, than had been calculated in the first place, in order to place the mines in a state of exploitation which will respond to the hopes and the needs of this archipelago.

The association then determined to name a commission of their own body who should visit the mines and listen, upon the ground, to the explanations which the director should see fit to give, and to propose as a consequence the necessary measures for the most speedy realization of their propositions.

As a result of this visit the corporate capital was raised to the sum of 200,000 pesos, and new works in depth were undertaken, in consideration of which, according to the observations of the engineer, the grounds were acquiring due consistency; the veins were presented with more regularity, and the minerals were showing better conditions in proportion as the labors were proceeded with in a vertical sense.

In this situation and already taking out pit coal, although not yet in great quantities, there arrived at these islands the worthy authority who to-day rules their destinies.

The Marquis of Oroquieta, from Spain, was informed of the existence of the association, and comprehending the immense advantages which the exploitation of its peculiar coals would bring to this far province, from the first day he showed the greatest interest in the happy result of the business, and offered every kind of aid and protection in so far as was compatible with law and justice.

He made a participant in his patriotic work of the illustrious General Polo, who loaned himself generously to the end that tests of the Sugud coal should be carried to a finish in the ships and establishments of the State, under the supervision of engineers of the navy; proofs which have been completely satisfactory, because the royal navy has declared officially that the mineral could be substituted without great disadvantage for the foreign coals that to-day are burned in the navy.

Not yet satisfied with this, the governor-general, impatient to see a large production from the mines, an incident which involved great projects for the aggrandisement of this country, sent officially to Sugud a distinguished military engineer, that he might inform him in detail of the actual state of the exploitation and its probable results.

The fruit of that commission is the very luminous memorial which we publish in

continuation of this, and which the modesty of the author restrains the company from praising as he deserves.

Studying this work with care, and taking into account its apt observations, believing by all means the work necessary that it points out, and accepting with profound gratitude the patriotic counsels of the superior authority, this association has judged it necessary to increase its sphere of action. To that end it has determined to issue and offer to the public another thousand shares of the same value as the former, raising in that manner the company's capital to 400,000 pesos.

The immediate disbursement of the new shareholders will be only 125 pesos per share, equalizing in this manner with the present shareholders. But in case, as it is not hoped, the capital is consumed so that it would be necessary that new assessments should be paid in, up to the completion of the 200 pesos which each share represents, it will be divided equally among all the shareholders, whose obligations to the company will terminate definitely with the payment of these 200 pesos.

To conclude this slight sketch of the actual state of the association, it is due to the association to state that the facts and figures contained in this statement have been verified and confirmed by the working commission named in the board convened at Malacanan, under the presidency of the most excellent governor general, and that the said association, more confident than ever of the richness which the rich deposits of the coal on its property contains, and profoundly convinced of the immense advantages that, with its exploitation on a grand scale, it must bring to the mother country and to this beautiful Filipino land, it finds itself disposed to suffer every class of sacrifices in order to proceed with the splendor of its honorable obligation whatever that may be resulting from the new issue of stock. However, it is possible that all the efforts combined of the old shareholders may not be sufficient to accomplish the object it desires; it begs the aid of its fellow-citizens, in order to insure more and more the accomplishment of an enterprise worthy of our great past in Oceania, that it may respond to the necessities of the present civilization and that will win for those who realize it the veneration and gratitude of future generations.

Manila, December 15, 1877.

Z. Y. DE ALDECOA,
Managing Director.

The following document is printed with the above prospectus:

[MEMORIAL.—THE COAL MINING INDUSTRY AND THE FUTURE OF THE PHILIPPINES.]

It is unquestionable that in this age of steam the colliery wealth of a country is the barometer of its industrial and commercial prosperity. Since the celebrated Watt applied the new motive power which so justly has immortalized his name, the industry and all connected with it, unfolding in new horizons, has taken such lofty elevation.

The governments, who, comprehending their interest, aided with enthusiasm the new invention by affording at all cost the indispensable element for its development, were not delayed in attaining the due reward for their efforts, seeing their countries placed at the head of all the rest, and transformed into great centers of modern civilization.

For such reasons all this that is of influence directly or indirectly in the exploitation of combustible mineral ought to be regarded with preferred interest, to all the rest. As is well said by Berrard, the production of a precious metal has an isolated value; coal, on the contrary, animates all that is found within its radius of action. It is coal that creates manufactures of all kinds; it is coal that centripetates the roads of communication; and while the value of a kilogram of gold or silver hardly succeeds in duplicating, by the exchange, the transportation and the work, who is capable of determining a limit to a ton of coal, that being worth an insignificant

amount coming out of the mines, starts by attaining a price many times tenfold by the transportation, and ends by producing daily a work of 10-horsepower of steam.

If we should try to search the cause of the preponderance always increasing of England, we would find it out by only fixing the mind on her four great coal areas, that, embracing an extension of 1,570,000 hectares of coal land, give annually to the industry more than 340,000,000 of metric quintals of coal.

When all the world thought that France, in consequence of the disasters that have lately weighed upon her, would late or never regain her vigor, with general surprise she was seen rising, as if urged on by springs, in order to place herself higher than ever. The powerful arm of industry alone was able to cause a consequence so unforeseen and sudden.

Unfortunately in our beloved Spain so much does not happen. The nation, which once gave products that disputed in all the markets of the world, finds herself to-day prostrated, not for want of elements, for it were difficult to have another more favored by Providence in minerals of all kinds, but on account of the civil discords that, taking her sons from agriculture and industry, are washing with blood her fertile fields and making impossible the exploitation of the mineral wealth which her soil contains.

However, it is just to mention that there is a territory in the Spanish Peninsula, not always esteemed as it deserves, where all the misfortunes that have been desolating the country have been impotent to make it desist in the titanic struggle that it maintains with the most potent powers, with the purpose of not allowing the industrial spirit and the holy love of work to be taken from its soil, true guarantee of the regeneration of Spain, who supporting herself on this can soon be raised to the place that by tradition, history, and natural wealth belongs to her.

In this uneven contest between activity and intelligence the country to which we refer has always been seen defeated before the immense superiority of her opponents, to whom she is compelled to pay extravagant prices for the substance of her chief industry. Fortunately the day is not distant when their powers being equalized she will be able to aspire to the victory. The supreme government is at present making huge efforts to free the peninsular industry and navigation from the ruinous tax which they have to pay for coal to England and France, protecting in fact with all her power those enterprises that are exploiting the coal deposits existing in the mother land soil as rich in quantity and quality as those of foreign parts. When this happens in the peninsula where, by its proximity to the productive centers, on account of the facility of communication, the native element that interests us has a price that, according to authentic data we have before us, very seldom reaches 7 pesos per ton. What will happen to the new-born industry of this beautiful country where the coal reaches after having been brought more than 3,000 leagues of distance, thus increasing its value to 20 pesos and never falling below 12½?

Under such conditions it is useless to reflect upon the development of industry and steam navigation in this Archipelago, that will continue paying enormous taxes to Europe and America, while aided by the spirit of association, the Archimedian lever of the present age, there is not put in exploitation the rich colliery banks she possesses. The present memorial has for its object to make known the actual and probable future state of the mines of "Sugud," in Albay, owned by the coal mining association entitled "La Paz," that has made, and is making, the utmost efforts to establish an exploitation on a grand scale. That this slight work may contribute something to the success of so plausible a purpose is the greatest reward to which we aspire.

In the meantime, not to weary ourselves in repetition, with the exploitation of the Philippines coal, a political object will be obtained, a release from paying tribute to nations that may some day be our enemies; a humane end, because with the development that the industry will take, the native will learn to love work, the chief of all

virtues, and lastly a high patriotic object for the encouragement of them, commerce will increase, and there will increase rapidly the immense wealth that is contained in this Archipelago in a latent state.

DEPOSIT OF SUGUD.

Before commencing with the description of the Sugud mines, in order to excite that indulgence we so much require, we ought to state that whatever facts it contains have been acquired in the brief term of twenty-four hours. This fact alone would be enough in order to comprehend that, though our abilities were very superior to what, unfortunately, they are in reality, it would not be within human power to describe with scientific accuracy a coal bank, and less still in a country not geologically studied and that presents so many difficulties for this kind of work, but, indeed, we believe they are sufficient to deduce therefrom the importance of the bank as much on account of its quality as its probable quantity, which is the object we propose.

At $13^{\circ} 8'$ of latitude and $130^{\circ} 22'$ of longitude, from the meridian of St. Fernando, and to the south of the island of Luzon, the bay known by the name of Albay is to be found, from which the claims called "Santa Rita de Manzano," "Angeles de Manzano," "La Paz de Manzano," "Santa Rosa de Manzano," and the "India" commence, which, embracing a zone of 600 meters in width, cross the island from coast to coast, taking for a point of commencement the village of San Esteban and following the direction N. 20° W., S. 20° E.

All the claims which have been enumerated are those that, together with the other twenty-four lately denounced in the island of Batan, called "España," "Filipinas," and "Albay," 6 kilometers distant from the village of San Esteban, constitute the property of the mining company entitled "La Paz," and which have served us for the acquisition of the figures, both topographical and geodetical, hereafter set forth. If, commencing from the village of San Esteban, the island is crossed in a direction from north to south, approximately, a series of hills or smooth slopes are found that, gaining height gradually toward the east, terminate in the Pacific Ocean, and gradually sloping toward the west terminate at a distance of 5 kilometers, where the Sugud River has its course, into which some of the creeks that separate them flow, and in the same direction, from east to west, with only slight variations.

The distance, that midway between both coasts following the indicated route and the zone of the area whose topographical description we have just sketched, is covered over with a vegetation in which samples of the colliery flora are abundant, represented by the species of the Acotyledons family of ferns, with the variations from the genii Pecopteris, Neuropteris, Sphenopteris, and Adontopteris, a species that, as is known, constitutes the characteristic mark of the flora mentioned. There are also to be found with equal profusion the species of the Monocotyledons and the family of the Lycopodiaceas, whose trunks, called Lepidodendrons, show the impression of their leaves in a rectangular form, with a vertical diagonal. All the species which we have just enumerated show a great similarity to the fossil specimens which have been found in all the coal deposits and whose notable collections have enabled Brongniart to describe 501 species of those that took part in the formation of this rich combustible.

A slight vein of vegetable, clayey earth covers completely the territory of which we treat. There exists in some places deposits of superficial sands madreporine in great quantity along the coast, blocks of limestone, blue in color, fine grain, and of various sizes, containing nodules of great hardness and purity crystallized. The said blocks or stones are to be found at different depths, mixed with decomposed clay of an ash color, with spots of lime dissolutions that are converted in some parts into grains from 5 to 6 millimeters of diameter. It is noticeable that of this kind of ground some of the hills that have been formerly described are formed.

Following the course of the creeks there are found banks of conglomerates, which elements are united by a calcareous clayey cement of weak consistency. At a short distance others exist in which quartz predominates, alternating with mica and decomposed feldspar. They are bound by a silicious cement of great hardness, forming true pudding stones.

Between these banks there are inserted clayey schists, greasy to the touch, that separates itself into layers of stones of a dark ash color, between which appears veins of coal of a decimeter of thickness. By going up a greater distance there should be banks of hard sandstones (grindstones), of which we have found some samples brought down by the current.

The plans of stratification are, with slight variation, of vertical inclination, their direction being that of north 20° west, south 20° east.

The earlier investigations relate to the creeks which cross the claims of Santa Rita de Manzano and La Paz de Manzano; in the same creeks we have examined three notable outcroppings of coal of a thickness varying between 3 to 27 meters, all of them in straight line, and with the same direction as the banks of conglomerates; their roof and wall, constituted of strata of clay, ash colored, and of little consistency. In the creeks that cross the claims of the mine India there exists another outcropping 4 meters thick, its roof and wall formed of two strata, the first of loose clay, and the second of clay sand of slight consistency, to which follows another of sandstone of large grain, very loose. Ascending the creek marked with the letter D, and at a distance of 40 meters, there is found another new outcropping of 1.30 meters of thickness, between two veins of clayey sandstone of dark ash color, separating itself into layers of stone of strata agreeing with those of the coal; continuing the investigations, going toward the east, there are, alternating with conglomerates, banks of limestone of fine grain, to which follows in an extension of 30 meters others of clayey schists of the same color as those forming the roof and wall of the outcropping lately indicated.

The strata are in parallel plains in a direction NS. 20° to 25° W., and of an inclination approximately vertical. Lastly, in the creek which is found to the south of the mine "India," there appears an outcropping of two meters of thickness between ash-colored clays of little hardness, its direction and inclination being analogous to those described. Of the detailed description that has been made to us of some fossils that have been found in the exploitation works, of which we shall treat more extensively hereafter, we suppose they pertain to some piece of Sigillaria, deducing from the said statement that they presented three vascular scars, one central and two lateral of larger dimensions, which characterize them. From the preceding data we draw the following conclusions:

First. That the Sugud deposit is covered by a layer of ground of recent formation (alluvion) justified by vegetable earth, sandstone, madrepores, and stones of different forms and dimensions.

Second. That under this covering, which we might call artificial, there appears, with all its geological characters, the ground of colliery formation, having been subject to the corrosive action of the currents from the creeks which separate the hills described, so clearing the ground of a more recent age, it has brought out evidence of its existence in seven outcroppings of coal which, with coordinate stratification, alternate with clayey schists, calcareous conglomerates, pudding stones, and sandstones.

Third. Combining the outcroppings, and bearing in mind that five of them are in the same direction and that its roof and wall present the same quality and color, we shall deduce that they belong to or form part of one central layer that, besides crossing all the island, also follows in the same way along the bay of Albay and the strait of San Bernardino, to reappear again with power, direction, and inclination approximately equal in the island of Batan and island of Samar, respectively.

Fourth. That, bearing in mind the second outcroppings, distant 40 meters in a

perpendicular sense from the direction of the first layer located in the possession of the mine "India," the banks of clayey schists of dark color, that alternate with conglomerates in the vicinity of the second layer, and the indications that appear in the other possessions of the mine "La Paz de Manzano," tending toward the east, we may conclude that the layer indicated is nothing more than one of those that, in union with the other surveyed from the mine "India," and the signs showing the existence of several others, form a contingent of this rich deposit.

Fifth. That if it is borne in mind that the three types of combustible mineral—that is to say, the anthracites, the bituminous coals, and the lignites—form a continuous mineralogical series, which concurs with the geological series of the ground; if, as it is supposed, there exists in the bank oily coals and anthracite, they are found rising toward the east, because the constituent elements, as well of the conglomerates as also of the pudding stones and sandstones, diminish in volume going in that direction, and this diminution establishes its more recent geological age.

Sixth. And lastly, that if we fix our attention not only on the surveyed outcroppings, but also on those that we know exist in the immediate islands, we shall deduce that the Sugud deposit is nothing more than an integral part of a great coal area whose center and limits it is not possible to determine actually.

We draw these conclusions: That the Sugud deposit presents all the characteristics that show richness of combustible; the only geological knowledge that we have of the constitution of this territory is that the next above it in transition already indicates that it may contain deposits of coal. Without any more than these data we may make known that there are companies in Europe (Switzerland) who spend actually considerable capital in search of deposits of the combustible mentioned, for that purpose having had to make borings of more than 900 meters in depth, which, though without success up to date, they have not for that reason failed to undertake others of the same kind. In this which occupies our attention it is not necessary to make use of work so expensive, because nature has made clear, as well by the outcroppings, the schists impregnated with the coloring matter of coal, as also by the evidence and reminders that may be found in the courses of all the creeks, the true existence of two layers, and all the indications that show new and important mineral deposits in the immediate neighborhoods.

MINERALOGICAL CHARACTER OF THE SUGUD COAL.

The coal of this deposit appears, at the time of mining, hard and sonorous, breaking off in large fragments. It burns with rapidity, producing a prolonged white flame, of a color not unlike to bituminous substances, leaving as a residue from combustion a white ash without consistency or odor, attacked by diluted sulphuric acid, and a small quantity of very clear smoke.

The planes of stratification appear generally well defined, observing that there exists through them a tendency, though of little intensity, to slack when they are long exposed to the action of the air. In the fragments where there is bifurcation of strata there are observed in some of them the results of a slide, results that are inherent and accidental, following the coal formation. If a fragment is cut by two planes that, being perpendicular between themselves, are also perpendicular to the strata, in the hardest production there exist concentric flutings of great brilliancy, called by the miners "partridge's eyes," which indicate much wealth in carbon. Lastly, there are observed in some strata yellow spots of iron sulphuret (pyrites) in small quantity and others that are red from the oxides of the same metal.

From the preceding data it is deduced that the mineral is noncokable, suitable for steam engines, and that, on account of its prolonged flame and on account of the richness in carbon it contains, ought to produce very energetic fires; that its lack of bituminous substances, which makes it very dry, occasions very little more expense

for combustion, which is by no means inconvenient, being reimbursed as well by the qualities previously stated as also by the fact that it stains the boiler tubes very little and does not adhere to the furnace bars, circumstances of very great interest, as well for stationary engines as for those of vessels, more especially for war ships. As there is no doubt (and such is the opinion of the most competent authors on the matter) that the best analysis of a coal is the one obtained in making trials of it for the use that is intended, there accompanies, as a continuation, documents Nos. 1, 2, and 3, which show the results obtained in the official proofs made by our navy burning Sugud combustible, comparing it with those of Cardiff, and the testimonies of the chief engineers of merchant steamers *Leyte* and *Camiguin*.

From the reports issued by the navy, acquired by repeated tests burning alternately Cardiff and Sugud coals, it appears that the second is superior to the English by reason of the following important conditions:

First. It raises steam from twelve to fifteen minutes sooner, keeping up the pressure.

Second. It stains the boiler tubes much less.

Third. It gives less smoke, and this is white.

It is, on the other hand, more expensive, at the rate of 25 per cent for stationary engines and 40 per cent for those of vessels.

From the merchant marine tests are deduced the same results, with the difference that the consumption does not exceed Cardiff coal more than 20 per cent, and the good condition that it adheres much less to the furnace bars.

So that, placing ourselves in the most unfavorable case, if the coal can be had 40 per cent cheaper than that of Cardiff, the inconvenience in the excess of consumption is annulled, and it will have preference under all circumstances, although the firemen will have more work; this is with augmentation reimbursed in not having to clean the boiler tubes and furnace bars so much.

Very well. If the deposits are presented in regular condition, the Sugud coal could be had at 4 pesos per ton by the navy, with which no other can compete; and then, bearing in mind that the average paid for Cardiff is 14 pesos, a benefit of 8.40 pesos per ton will be the result, taking into consideration the increase of 40 per cent for the greater consumption. Inasmuch as the merchant marine, as also stationary engines, use Australian coal, very inferior to Cardiff by all means, and although the price is 8.50 pesos, it can never compete with the low prices of Sugud.

It is necessary to know that for all these calculations we have started from the most exaggerated data; a coal that can be said is from the surface has been compared with the best known in the world, which is mined from the heart of its coal areas. Is it not logical to suppose that at greater depths, when the veins become more uniform, the coal will also be of better conditions? Such is at least our opinion, which we hope to see confirmed by development.

It remains to us, in order to finish this part, to give the scientific explanation of the difference which appears among the different tests made of the Sugud coal, for while some, as we have seen, do not give more than 20 per cent of expense over Cardiff, in others it reaches to 40 per cent. The reason of this, to all appearances an anomaly, is made clear, if it is borne in mind that in order that the results should be alike it would be indispensable that the engines were also alike in all their parts, and more especially in all those parts which influence the draft. Very well; the navy has the section of their furnace bars, chimneys, smokestacks, etc., fitted for the draft that is suitable for Cardiff coal, which of all known coals is the one requiring the most draft; the merchant marine have calculated for Australian coal, which requires much less. For such reasons it is evident that for the test of the Sugud coal, which needs less draft than even the Australian, it was much less expensive for these last on account of the draft being arranged more nearly to that which is suitable. In the report given by the navy, it says, at the end, that it is a very difficult problem, and

that as yet the power has not been given to regulate the draft at will in order to conserve all the caloric power of different kinds of combustible, securing the minimum of consumption. We agree, but we differ in this, in reference to the particular point which occupies us; it is not so much to increase the draft as to diminish it; for the first it would be necessary to change the dimensions of the spaces of the furnace bars, of the chimney, fire boxes, and smokestacks, while for the latter, which is the actual point, it would be enough to secure the result to take two sets of furnaces, one for Cardiff and the other for Sugud, with which, besides diminishing the expense in an amount, we believe, not less than 20 per cent, there would not be incurred the defect of having the engine fitted for only one kind of combustible.

EXECUTED WORKS AND COURSE WHICH MUST BE FOLLOWED.

Having seen the quantitative and qualitative importance of the Sugud deposit, let us occupy ourselves with the description of the works which have been executed and the course which ought to be followed according to our opinion. The first consist in a tramway which, starting from the edge of a pier permitting vessels of 20 feet draft to anchor, ends in the mouth of the main shaft, after having reached an extension of 3 kilometers; in 130 meters of horizontal gallery, which starts from the main shaft at 11 meters from the surface; in another gallery of the same nature, which, starting from the San Jose shaft at a depth of 24 meters, and following the direction N. 20° E., S. 20° W., approximately, runs for a distance of 188 meters; lastly, in a main shaft, and those called San Jose, Santa Julia, San Juan, Aldecoa, and chimneys Nos. 1 and 2.

In the property of the company mentioned there is likewise an administration building, located in the neighborhood of the pier; a camarin, newly constructed, where 150 laborers can be comfortably lodged, located in proximity to the Santa Julia shaft; a dismounted steam engine of 20 horsepower; a camarin for storing coal, with a lever to weigh wagons and materials in considerable amount.

The layer in all the extension where works have been established is of excellent conditions in its mineral, and with variable thicknesses between 3 and 7 meters, in an extension of 124, which is the one comprised between chimney No. 2 and the San Juan shaft, starting from some crosscuts indicated in the plan of No. 2. From these last to the main shaft, and the one of Aldecoa, there are irregularities in its quality and thickness, presenting in some parts very good conditions, as happens in proximity to the Aldecoa shaft, while in others it is entirely broken to pieces by the clay stones, which we have described in making the geological sketch of the deposit.

In consequence of what is said it is deduced that the works are not at the suitable point for exploitation, besides, as it appears if mining the mineral from the indicated cuts of the San Jose shaft going toward the Santa Julia could be continued, the proximity in which the gallery is found to the bed of Panogsogon Creek renders it entirely impracticable. In the remaining parts it would not give a mineral of suitable condition to accredit the deposit; and lastly, there does not exist works for advancement in order to continue the exploitation in a regular and orderly course. It being indispensable to proceed with new works, we shall first present a calculation of probabilities, which is that which shows us the course they have to follow.

If we bear in mind that whenever the layer has irregularities it is exactly in all points where stones appear mixed with decomposed clay, we shall reach the well-grounded supposition that at greater depths the deposit will appear in better conditions when this kind of ground disappears, contrary to colliery statutes.

Observing that at the depth of 30 meters of the San Jose shaft all of it opened in the kind of ground just described, there appear layers of clay recharged with bituminous substances, and of much consistency and hardness, then we may logically suppose that the change in the geological constitution will not be at great depth.

Taking likewise into consideration that at the depth of 27 meters of the trial shaft

of Cape Pedro the layer has appeared with much more regularity and the clays of a darker color than those found at less depth, these are all circumstances that lead to the same conclusion as that of the former paragraph. Wherefore, the kind of works that ought to be undertaken is in a vertical sense and with preference those in which the layer is presented in poorer conditions and not proceeding with horizontal works until there exists a plain conviction that they can give good results.

It is likewise the opinion of the undersigned engineer that new works ought to be tried in the place called India, where there appears, as we have seen, two layers on the surface and indications of others, being a mineral of as good quality, in spite of being under atmospheric influences, as that taken from the works which we have formerly described.

The course which ought to be followed, after having marked the direction of the layers, is to make investigations through trenches in a perpendicular sense to its direction until they are brought to view; to undertake afterwards vertical works placed on the wall of the layer which shall facilitate the investigations that ought to be made of the same, from 10 to 20 meters in depth, and verifying by those preliminary works that the layers are presented with regularity in order to be exploited in longitudinal extension of 300 meters, commencing the works by galleries of prolongation at a distance of 30 meters one from the other, in order to proceed in succession to the exploitation, which will be made by crosscuts of labor ascending or forward. At the same time this is undertaken, to start from the greatest depth, with transversal galleries of investigation, in order to go in search of new deposits of whose existence, as we have already seen, there exists as most positive all the indications which science has.

Works of the same kind ought to be established in the newly denounced claims, of which we have the best information, but about which we have not occupied ourselves on account of our not having been able to investigate them.

Following the procedure mentioned, it is obtained that the works of investigation serve this purpose when it is resolved to establish fields of labor. In case this should not succeed, then by boring, which, on the other hand, is not applicable to the present case without serious inconveniences, because the layers are presented almost vertical.

Briefly, we shall say that, bearing in mind the quantitative and qualitative importance of the deposit, the security in mining the combustible, and the protection which so loyally is granted to it, no society of this kind has been founded under better auspices and with more probabilities of great success if it undertakes the works with the assiduity and constancy that they require.

In view of the many facts this writing contains, we can not do less than reaffirm what we have already said on another occasion—that is, in declaring that the Sugud deposit is worthy of the interest with which our worthy chief authority and all those who boast of themselves as good Spaniards have protected it.

Manila, October 1, 1877.

RAMON MARTY.

DOCUMENTS PREVIOUSLY CITED.

COMMANDING GENERAL OF THE NAVY OF THE PHILIPPINES; THE MAJOR-GENERAL OF THE PHILIPPINE NAVY:

EXCELLENT AND ILLUSTRIOUS SIR: Having been honored by your illustrious excellency with the presidency of the commission charged with testing in some of the ships of this squadron the coal from the mines of Sugud, province of Albay, and although said test has not been completed, since there remains the trials which are to be verified from the gunboat *Caviteño*, as this boat will necessarily be delayed for some days yet in making a list of its works, I believe it due to myself, without preju-

dice, to give your illustrious excellency an account in extenso of the proofs already affected, directing attention in this notice to the results which have been obtained up to the present time.

This combustible in all the ships in which it has been tested raises steam sooner than the coal of Cardiff, the difference being estimated at some twelve or fifteen minutes, and sustaining well the pressure in the boilers.

The coal of Sugud likewise has the appreciable advantage of staining very little the boiler tubes, it not being necessary to wash them more than once in eighteen hours, and neither does it adhere to the furnace bars, without doubt because of the small bituminous substance which it contains. On the other hand, there is a circumstance implying a greater disadvantage, which is that it burns very rapidly, occasioning the consumption, on that account, of so much more.

The excess of expenditure which this coal has over that of Cardiff, generally used in this department, the commission calculates, on account of all the circumstances, more or less favorable, occurring in the different trials, is not less than 40 per cent. However, this excess is much less in the engines on the land, because that in the tests made in the shops of the arsenal it was said to be not more than 25 per cent, resulting in perfectly natural causes on account of the less difficulty and the greater perfection which these apparatus have over those which are used in the ship.

The coal that is treated of makes little smoke in burning, and this is white, a favorable condition, likewise, on account of the small amount that it soils the rigging, and because it does not develop the presence of a ship, in certain well-understood circumstances, and on account of the quantity of ashes and cinders which is left from its combustion it may be calculated little more or less than that which is left in the residue of consumption of any other good coal.

Then the coal of the mines of Sugud has the general good conditions, and I do not believe it adventurous to say to your illustrious excellency that I believe it is acceptable for the purposes of consumption in the ships of this squadron, taking into account, naturally, that its price compensates this greater consumption that is indicated heretofore, and the greater labor which is afforded as a logical consequence to the firemen of the ships, and I make no account of this that the excess of expenditure diminished the coal bunkers, because that this difficulty, which would be serious in long navigations, does not have, according to my judgment, great importance in the squadron of this archipelago on account of the existence of the coal deposits in convenient points.

Before I terminate it appears opportune to add one observation. Your illustrious excellency understands much better than I that the proportions of the different parts of the furnaces, with relation to the combustible which is burned, as also the draft, exercises the greatest influence upon the chemical operation of the combustion, and that these proportions, notwithstanding the many and repeated studies which have been effectuated and the infinite experiments made, it is not yet possible even to fix upon the precise manner that will satisfy all of the conditions.

I say this, excellent sir, that if it should prove an objection on account of the greater consumption of Sugud coal, that this greater consumption might be in a measure diminished by narrowing the openings of the furnace bars. In the first place, this greater expenditure of coal depends upon its organic composition. This is on account of the lack of bituminous substance, and not because it crumbles much and leaves unburnt any part of the charge of the fire box, as is proved by the ashes and the remaining residue.

Then, that this variation in the fire-box grating is a subject that I consider in the extreme delicate, it being in nowise convenient that fire-box gratings of ships of war be prepared especially for the use of a determined combustible.

Cavite, November 12, 1877.

MANUEL J. MOZO.

TO THE MOST EXCELLENT AND ILLUSTRIOUS COMMANDING GENERAL OF THE NAVY.

SPANISH STEAMER LEYTE.

[From Tabaco to Manila.]

MANILA, April 30, 1877.

Having taken on board of this steamer, in Sugud, on the 21st of March, 18 tons of coal from the mines of that place, and having used it on our voyage to Manila, it has given a satisfactory result; however, it has not been a true test of the qualities of combustion of the coal because the quantity was so small it had to be mixed half of the time with other common coal that was in the coal bunkers, and as there was very little breeze during the entire navigation the wind has been much less than that which is necessary in order to secure the consumption of coal in the furnaces. The consumption has been nearly 10 per cent more than is consumed by us with the use of Australian coal and 20 per cent more than that of Cardiff.

The coal is very clean and dry, so it is that our boiler tubes at our arrival in Manila were clean, notwithstanding their not having been washed in the course of thirty-nine hours. Using Australian coal, we have to wash the boiler tubes each eighteen hours, and if there is little wind, each twelve hours. The coal neither burns nor injures the furnace bars of the fire boxes and gives scarcely any smoke.

ARTHUR LE HAY, *First Engineer.*

STATEMENT OF THE UNDERSIGNED UPON THE COAL OF SUGUD, IN THE PROVINCE OF ALBAY.

Following is the result of various kinds of coal consumed daily with a mean rate of speed of $7\frac{1}{2}$ knots per hour:

	Tons per day.
English coal	$3\frac{1}{2}$
Cardiff coal	$3\frac{1}{4}$
Australian coal	$3\frac{1}{2}$
Sugud coal	$3\frac{1}{2}$

The steamship *Camiguin* has an effective force of 125 horsepower, and using Sugud coal it consumes two and three-tenths pounds per horsepower per hour.

I can assert that said coal is of a good class for steamers, because it is equal in force and result to the English coals of Newcastle and the Australian coal.

It has an advantage, more especially, because it produces very little ash, for which reason the furnace bars last much longer, this being an item that figures in the expenses of an engine.

Manila, October, 1877.

G. HAYDON,
First Engineer Steamer Camiguin.

PETITION OF APRIL 3, 1878, FOR ADVANCE FROM PROVINCIAL FUNDS.

MOST EXCELLENT SIR: Mr. Zoilo Ybañier de Aldecoa, managing director of the Coal Mining Association La Paz, with due respect, has the honor to show to your excellency: That owing to the different circumstances that were encountered, and that this association previously stated to your excellency in a writing of December 1 last, and the necessity that was seen of seeking a greater extension of its resources, because the means were not sufficient to place the mine in a state of exploitation; and the enterprise desirous that the business be representative of an exclusively national interest, because of the considerations then admitted, inferred that the measure that would most easily reconcile this laudable purpose with its necessities, was to make a new issue of shares of the value of \$200,000 (pesos). Being thus agreed, and knowing

already the favorable disposition of your excellency toward the outcome of this enterprise as an organ for the future of this country, an economic and political interest of the highest preeminence that could not hide itself from the clear intelligence of your excellency, and which you gave evidence of having penetrated from the very moment of your arrival in the islands, it resolved at the same time to solicit of your superior authority, as you had opportunity that you would be pleased to give your aid for the placing of the new shares among those of this neighborhood, by means of which, and if the outcome of the enterprise did not disappoint the hopes that it promised, there would be secured at once the diffusion of the spirit of association here, where so much opposes this, such as the lack of strong capital, the distance at which it is found from the principal centers of business, the abandonment in which the most powerful elements of wealth lie, which this productive soil conceals; ignoring the spirit of speculation and the grand necessities of which this country is lacking, but that through these means could be accomplished, rendering difficult by their lack the development of agriculture, commerce, and industry. Your excellency, being persuaded that for the realization of all these advantages it was indispensable that the giving of coal to the country precede, did not hesitate to take under your auspices the placing of the shares; but the efforts, that with indefatigable solicitude the worthy director of civil administration has in fact attempted, seconding the desires of your excellency and inspired by the same thoughts, have been dashed to pieces by the aforesaid conditions of this community, or it may be by the scarcity of capital, by the absence of the spirit of association, and by the suspicion which the mining business engenders, due to the circumstances of these enterprises having been undertaken by spirited but imprudent individuals, unprovided with sufficient capital, and who exist everywhere, although here these things can be realized with greater economy because of the cheapness of day labor, and more at Sugud because of the favorable circumstance of the proximity of the mine to the sea.

The association, being convinced that the insignificance of the capital subscribed was not sufficient to extricate it from its perplexity, since, if this were, the resources yet existing of its capital stock might be sufficient, and that on account of finding itself at the end of a few months perplexed by the same difficulty, it would not conduce to its interests to change its present constitution by the admission of new shareholders who would direct the future of the enterprise without bringing to it more than an insignificant interest, so the association was agreed upon directing that this should be placed in the knowledge of the superior authority of your excellency, with the expression of our profound gratitude for whatever your excellency, from your exalted office, should be pleased to do in aid of this enterprise.

The association, most excellent sir, possessed of the same spirit of nationality which induced it to solicit previously the patronage of your excellency for the placing of the new shares, and by virtue of that attempt having been frustrated, has agreed to address itself anew to your superior authority, proposing to you another means of assistance, that without the inconvenience of that previously attempted, perhaps may be more efficacious of the object of quickly placing the mine in a state of proper exploitation. Most excellent sir, the provincial funds, destined to supply, by means of the advantages of general interest, the necessities of agriculture and of commerce, contributing by the means most adequate for the discovery of the elements which constitute the public wealth, it appears that within the scope of their object would be the application of them to the encouragement of the exploitation of the mines of coal, by which it is beyond controversy that nothing could here contribute with greater efficacy to the wealth, the soul of commerce and industry, than the gift to the country of abundant and cheap steam. In this conception, the association makes bold to solicit of your excellency that from said funds there may be advanced to it 100,000 pesos, on condition that they shall be returned with the value of the first 25,000 tons of coal that may be taken from the mine, and which shall be delivered

to the State at the price of 4 pesos a ton, which represents less than the third part of that which it costs the State to-day.

This advance would be an act analogous to the subsidies which the State offers to the railroad enterprises, steamships, etc., but with the advantage proposed to be effected by the condition of repayment, besides promising it the same indirect compensations as the others. The repayment should be counted as a probability, since with 100,000 pesos, and the portion of the association's capital which yet remains, it is nearly certain that the mines will be placed in a state of exploitation which permits the extraction of this tonnage of coal, if not at once, yet not beyond a year.

Such operation, most excellent sir, appears to be within the spirit of the royal orders of January 30, 1854 and 1856, by which it was ordered that the superior governors of the islands shall give to the enterprises engaging in coal mining every aid and protection which its development demands, intervening in the contracts for coal for the navy, and even paying for the coal of the islands in the first years at the price of foreign coal, a thing that by being done would be without doubt in the interests of the State more weighty than the repayable advance which we solicit from your excellency. On the other hand, the association has understood that these advances have already a precedent, having been carried into effect in the case of Mr. Diego Viña, the first exploiter of the mines of Cebu.

In the conditions through which this society has passed, it has already consumed its resources without profit or progress, and it urges you, most excellent sir, to take a definite action in respect to the future of the mines. Your excellency will permit me, yielding to the pressure of a similar state, to urge for your consideration the necessity that you be pleased to communicate to us an early decision, in order that we may not prolong our sacrifices unfruitfully.

It is grace that we hope to obtain of your excellency, whose life may God preserve many years.

Manila, April 3, 1878.

Z. Y. DE ALDECOA.

To the most excellent GOVERNOR-GENERAL OF THESE ISLANDS.

REPORT OF DIRECTOR OF CIVIL ADMINISTRATION ON ABOVE PETITION.

MOST EXCELLENT SIR: Don Zoilo Ybañer de Aldecoa, managing director of the coal mining association "La Paz," has recourse to your excellency in the name of said association, with the purpose that 100,000 pesos be advanced it, in the nature of an anticipation, in order to hasten the works that are commenced on the mines of its ownership, and which amount would be paid back with the first 25,000 tons of coal that is extracted from these works, which would be the result by the purchase price of 4 pesos for each ton, truly a great benefit to the State's interests.

Up to the present, and your excellency animated by a desire to increase the public wealth in the Philippines, and without curtailing any kind of legitimate means, has demonstrated your great interest in protecting the exploitation of the coal banks of Sugud, where the mines of the association "La Paz" are located, and in accordance with such design an attempt was made to reorganize said association, with the concurrence of the individuals who compose it, doubling the capital stock, issuing 1,000 shares of 200 pesos each, in order to raise 200,000 pesos; interesting the notable persons of the country, according to their willingness, in the purchase of shares in it and the State to the extent of 200 shares, which might also be necessary (the Supreme Government also concurring in it) as a means of furthering the mineral industry in the Philippines, and furnishing, finally, every other recourse that could be employed, in order to secure the benefit of such noble purposes.

Unfortunately results have not corresponded with the aspirations of your excellency, because capitalists, preoccupied yet with the great losses that they have suf-

ferred, who have already been compromised in enterprises of this species, have remained reticent, and without interesting themselves in the acquisition of the shares issued; and because the development of the wealth and mercantile business of the Philippines being very extraordinary there is not enough for the necessities of agriculture and commerce; and because the interests that they produce are of greater extent.

No one can doubt that, by the development of the public wealth in this country, it will be more effective and advantageous to have in exploitation some mines of combustible, sufficient for the different established industries, or those that may be established in the future; neither does it admit of doubt that this utility takes the proportions of a political necessity, if thought is taken of the distance which separates us from the Peninsula, inasmuch as there is here consumed by the naval and merchant marine coal imported from Europe, and inasmuch as the least international complication might deprive us of that which, at present, is consumed in the Philippines, and paralyze in a moment, and suddenly, the life of a State that has six million inhabitants, and with a rich and vast territory divided into islands which can only communicate among themselves by means of steamers.

The reasoning expressed, perhaps with excessive earnestness, but whose importance is made notorious, is strengthened with the great force that facts and opinions, as well of an official as a private nature, furnish to it relating to the bounty and richness of the coal banks of Sugud, and the facility with which they might be exploited and their products applied to the multitude of necessities which progress has created and developed in modern times; and of the bounty and richness of those deposits there is as good proof, the statements emitted by the inspectorate of mines, and by the special commission charged by your excellency to make new studies concerning them, and whose respective documents should be united to this incident for the greater illustration of the subject in all its phases, and as a necessary means for the government of His Majesty that it may determine in due time with perfect knowledge of the case.

In view, therefore, of the reasons expressed, the director who subscribes considers it of great utility to encourage the exploitation of the mines of Sugud by those means that the Supreme Government approve after having complete knowledge of the transcendence and importance of this subject. But he believes the proposition of Mr. Aldecoa inadmissible, because it places upon the State the realization of a considerable expense without due intervention and fiscal control on its part, and whose repayment it may be supposed is doubtful, or at least fortuitous; and he considers also as equally indispensable that your excellency, for the present knowledge of the most excellent administrator of the colonies, in order that he may adopt the proper resolution, call his attention to the situation of the Philippine treasury, and that this being undertaken, that it will place upon it new obligations without furnishing the means for its satisfaction. Notwithstanding this expression, your excellency will decide.

Manila, April 15, 1878.

29, approved.

J. C. DE HERRERA.

The suggestions of the directorate of civil administration being approved by the governor-general, the petition last quoted, with its accompanying papers, were forwarded to Madrid on April 15, 1878, but in the meantime that Government had considered the proposition of December, 1877, for a proposed subscription of 200 shares from the public charities and local funds, and had issued the decree of April 6, 1878, so effectually discountenancing this character of aid that it seemed entirely unnecessary to consider the proposed advance from provincial

funds. This decree of April 6, 1878, is given in full, and from its contents it can be seen that the hopes of the association for further substantial aid from the State were dashed in pieces, and in 1880, after a hopeless struggle to carry on an extensive mining development without money, the association of "La Paz" gave up the effort and passed into history.

ROYAL ORDER OF APRIL 6, 1878.

MOST EXCELLENT SIR: The expediente commenced in view of your excellency's letter dated December 30, last (1877), accompanied by sundry documents relating to the propriety of the State becoming interested in 200 shares of 200 pesos each from those the mining association named "La Paz" proposes to issue in a new series, which association commenced to exploit the deposits of fossil coal of Sugut (Sugud), in the province of Albay, with the purpose of developing its workings and being able to solve that important industrial problem.

Noting that among the aforesaid documents no report or opinion appears which emanates from the inspectorate of mines of that district, which is the subdepartment called upon to illustrate and judge of that subject;

Noting that the treatise that, with professional character, gives the information about it is insufficient for that purpose, because it does not come from a professional person in that department, nor from a consulting suboffice of the administration;

Considering that in accordance with good economic principles and administration the State ought not to convert itself into an industrial institution, nor commingle its interests or those of public corporations with individual enterprises, not even with the laudable object of determining problems, such as we are speaking of, but that it ought to facilitate its good progress by the means of government that exist in its hands, to the end that they may obtain the best result in the development of its richness and that of the country;

Considering that with this laudable object the royal order of June 14, 1876, was issued, increasing the personnel and planning the mineral-geological studies in that archipelago of your worthy command, directed in the first place to coal-bearing lands whose results becoming known, as they may be, will demonstrate to the industrials which is the carboniferous wealth and its conditions of location, and in that case they will be able to unite for exploiting it with their activity and capital, let them come from Spanish or foreign houses, to the advantage of the country and the other industries to which that combustible can give life within the law, for the reason that these control;

Considering that the result which the laudable efforts attain that the association of "La Paz" displays pertaining to the coal industry will serve as a model standard and example to others that may be formed with like object, and being suitable and necessary that those forces be guided by the torch of science and the results of experience in those difficult exploitations, to the end that they may not be barren of results, as unfortunately has happened in former cases, from lack, doubtless, of study and foresight;

Considering, finally, the great extent of coal-bearing territory that appears to exist in that archipelago and the importance that, in various senses, it will have in due time on account of sundry industries, principally that of navigation, it is the desire of the Government of His Majesty to secure the direction of the forces so that there may not be a bad ending, and that a suitable development may be obtained, to which end, having heard the opinion of the superior official junta of mining, and in accordance with its advice, His Majesty the King (w. G. g.) has been pleased to resolve:

First. That the King expresses the pleasure he has in the good wishes of your excellency for the development of the coal industry of Sugut (Sugud), represented

by the association of "La Paz," expressive of your patriotism, which in many like instances has appeared to give encouragement to this important industry.

Second. That as a consequence of their administration under that point of view, it is not possible to approve, nor is it approved, that the public funds be applied to the purchase of shares in an individual enterprise, as your excellency proposes concerning the aforesaid "La Paz."

Third. That in order to facilitate the greatest advancement of these enterprises, your excellency will remit, in the shortest possible time, a code of regulations that should be formed for the more adequate official inspection of the mineral exploitations, as a consequent of the first and second general provisions of the royal decree of May 14, 1867; and,

Fourth. That while these regulations are being published, your excellency provide that the persons who, with the character of official directors, are placed in charge of the exploitations of coal shall be engineers or mine superintendents with titles as such, obtained in Spain or in a foreign country, to the end that they may unite the necessary legal and skilled fitness in order to manage it with advantage and guarantee the successful outcome of the interests placed in their charge for the safety (police) and health (sanitation) of the operatives, as was provided by the royal order of July 22, 1876, on account of the said association of "La Paz."

The association "La Paz" seems to have died a natural death, for there is found in this office the voluminous expedientes of the coal mines of this company, heretofore mentioned, as in process of denouncement of the coal deposits of the island of Batan, three in number, entitled "Albay," "Filipinas," and "España," the last entries on which were made on September 15, 1878, ordering the issuance of titles to the association, but no entry appears showing that such titles were ever issued, and this conclusion seems to be supported by the fact that these expedientes are found in the archives of this bureau. Had titles been issued these expedientes would have been returned to the provincial government.

The "La Paz" exploitation ended in a failure and with heavy losses to its shareholders.

CHAPTER XII.—CALATRAVA MINES, WEST NEGROS, 1874-1899.

The name of Viña is already a familiar one in the history of coal mining in the Philippines. In 1874 a new aspirant for honors in coal discovery appears in the person of Diego Viña, jr. This young man, for such his literary productions seem to indicate, has left on record a letter describing his expedition to Calatrava, in West Negros (on the eastern coast of that island), which is so vivid in its descriptions, so honest and ingenuous, and withal so accurate in its description, as I am advised, that I quote the letter almost entire. This letter is dated at Calatrava, on June 1, 1874, and is addressed to his father:

We arrived here at 4 o'clock in the afternoon to-day, commencing at once the work of exploration, which is the object of our visit, of the coal deposits of this coast of the island of Negros.

TOWN OF CALATRAVA.

Calatrava, the ancient barrio of Giluban, is situated on the seashore, on the right bank of the river of the same name, and on a small flat surrounded by sloping hills.

Its sorry aspect, and a village exceedingly miserable, denotes that its inhabitants are enemies of labor. We were very well received by the present captain, Mr. Leon Barban, who immediately conducted us to his house, where we have been the object of the greatest kindness. He voluntarily offered to accompany us to the mountains, alleging that he feared the savages, the only population of these forests, might do us harm. In short, we started out at 8 o'clock on the morning of the 2d to explore the mountains of Calatrava in search of coal. The expedition was composed of the captain, three other men, my brother John, and myself. Embarking in a boat we took up the journey, going up the river, well armed and with sufficient instruments for the occasion. We were taking the courses with the compass, from which, in twenty sightings that in the twenty turns in its navigation the river has, gave, by the resulting various courses, a direction between north and west, so that the probable direction of the river, from the mouth to where a small boat can go up, is N. 60° W. Continuing in this course for an hour and a quarter, and arriving near to the mouth of the arroyo Magasan, which is a tributary of the Giluban, here we left the boat and the guide made us go up this arroyo, which fatigued us very much until arriving at the summit, for we were going up a very steep grade without any road and with a very rough and stony surface. At last we reached the summit, where the hut of a savage is located. The appearance of these semisavage beings gave us an unfavorable impression, being compelled to feed on fruits and wild roots, plagued with a skin disease, and most repugnant; they resemble beasts more than men.

By our request two sons of these [people] accompanied us who knew the place where more veins of coal were found. We continued our journey, descending by the arroyo of Sinigasaan, searching for the Giluban again, although much higher up. On this course we had occasion to admire once more the beautiful vegetation of these tropical regions in its virgin forests, and above all its beautiful waterfall, which measures more than a hundred feet in height, which cost us much labor to descend, despite our hardiness and agility. We again encountered the Giluban, by which we continued to ascend until it forks with the Macasilao, which is the river where the croppings of the coal are found. We arrived at these at 6 o'clock in the afternoon, after nine and a half hours on the road. We only had time to see them and immediately to construct a small hut where we could sleep. This was quickly made. Placing some stones for pillows, we retired to sleep. Notwithstanding so many inconveniences we rested, but an inopportune rain storm came to disturb us at daybreak. Very early on the morning of the 3d we commenced the examination of the veins, commencing from the last.

VEINS.

First. This is encountered, as the others are discovered, in the same river bed. Its course is from east to west and inclines to the north with an inclination of 60°. The compactness or thickness is 13 feet, with a declivity in the middle. It shows a bare crest along the bank of the river for a length of 160 feet. The river measures at this place a width of 72 feet, its bed being a placer of hard clay. In fact, this same clay is the bed of the vein, and for a hanging [wall] it has a soft earth indefinite at this time.

Second. At 90 feet from the first the second outcropping appears which, being found in the middle of the river and under water, we were unable to examine.

Third. At 195 feet from this second one another outcropping of 138 feet is encountered. It runs east and west; inclining to the north with [an angle of] 40°; 12 feet thick, with a declivity in the middle of 2 feet; bed and hanging wall of clay; here the river measures 90 feet in width.

Fourth. At some thousand feet lower down we encounter another outcropping, which we were also unable to examine from the same causes as the second.

Fifth. Lower down another outcropping is presented, very much covered, but on the whole we ascertained that its course was N. 40° E.; it is found to be mixed with stone; its inclination is 50°.

Sixth. Two hundred feet lower down another outcropping is presented, with the same course, and with the same qualities expressed above, except the rock, from which this is exempt.

Seventh and eighth. Another 200 feet farther down two outcroppings are found united, which incline in different directions, with course from east to west, with 30° inclination. The quality of the coal of these last is very good, and it is from here that a sample was taken by us.

CONCLUSIONS.

It has surprised me that in the neighborhood of the veins the forest is not so thick as in the other places. This circumstance has permitted us to see that the land from here, without its being level, still neither does it appear to be mountainous, which would favor the exploitation of these veins. This, in addition to what those disclosed by the river, whose banks do not exceed 9 feet, shows also the proof that another class of labor is not possible than by means of shafts, which, as is known, always offer great difficulties because of the filtrations.

These considerations have caused me to desist from making examinations other than those already expressed, and I decided upon my return to town, which we proceeded to do, following always the course of the river with the object of seeing the existing conditions if at some time it might be necessary to make a road through it.

The river is incased between high meadows from Macasilao to the mouth of Magasan, and from there to the town it shows a little more width and is even navigable.

The road as sketched does not appear difficult to me; but the execution will cost a great deal because of the considerable distance that these veins are from the sea; because in all, or the greater part, it would have to go by declivities or slopes, exceedingly steep and for the most part in [live] rock; this, at least, is the poor opinion of the undersigned. On our return we cut off a considerable distance, but at the cost of much fatigue.

The 4th instant we passed in taking notes and reports for our second expedition to Falave. On the 5th we made a trip of exploration toward the barrio of Falave on horseback, but did not get farther than San Isidro for lack of a guide; and we were compelled to return to Calatrava.

There we sought information from two savages and a negrito as to whether it were possible to pass from Falave to the river of Cabatoy following the course of the river; the answer was in the negative, magnifying the dangers of that road, which was, according to them, an impossibility of impossibilities for us to cross through there. (Afterwards we learned that the savages had conspired in order that we might not know the way.) But I wished to see and ascertain for myself concerning what they said, on account of which I begged the captain to accompany us with enough people in order to go through by the way of Falave and surmount the obstacles which might be encountered until finding the veins of coal that are to be encountered in this river, according to the proofs from the fragments of this mineral that are sometimes found on its banks, and with the result that we decided upon the journey to that point.

SECOND EXPEDITION.

The 7th instant, in the afternoon, we started out with the purpose of sleeping in Falave, and from there to commence the journey early, and so we did. In fact, on the morning of the 8th we undertook the journey—eleven persons in all. Being animated ourselves with the spirit of discovery we followed up the river, which shows up very favorably for the passage of a road or cart road, since, although incased between lofty and sloping mountains, there are, notwithstanding, level tops sufficient for these passes. Forging the river now and again, but with little trouble, it is only at the place of Mine-Iltud, where a part of the road would have to be made

on a declivity, but for all the rest it is so easy that in some parts it would be possible to construct it from the trenches and only to cut the trees which at this time impede the passage. In this survey, that in my judgment will be little more than a league, the river is forded nine times and the cost of a horse road (trail) will be insignificant to the arroyo of Lalpal or place of Cabatoy, which is where we found the so much desired veins.

COAL.

In the arroyo of Lalpal a vein of coal is found which we examined after six hours of arduous labor in order to bring it into view. From the investigation it followed that it was not as good as we thought, since it only measures 5 feet in thickness and is somewhat pyritic; its course N. 50° W., and slopes toward the east with a rapid inclination of from 40° to 50°, so that we were not satisfied with our trouble, and therefore, and because it was already growing dark, we ceased from our labors to commence again the following day with our investigations; in fact, our efforts were not in vain, since, on the following morning, correcting and rectifying the operations of the day before and exploring these places more and more, we encountered another vein not very far from the first, on the same river, Falave, with the same course and the same inclination as that, but free from pyrites and with a thickness or compactness of 15 feet.

This last vein deserves our particular attention, since, besides presenting such an abundance of coal, it is situated in a position so advantageous that its exploitation could be made by the most easy methods that the mining art employs, because it is leading through a high mountain with only a horizontal gallery and a little higher than the level of the river, it is possible in a short time to take out much coal.

The topography of the land at this point is not unfavorable, since, in spite of the virgin forests which cover these places, from there up the mountains become separated and form a valley which to-day is found sufficiently cleared by the "Caguines" or clearings of the savages, the only inhabitants of those territories; in fact, without an instant's hesitation, I feel sure that the exploitation and transportation of the coal to the place of embarkation and port of Tagbaji would be easy, requiring very little trouble and capital.

THE MONTANES (SAVAGES).

The only drawbacks that are there encountered are these savages, who, led by Christians frightened away, and criminals, attempt to oppose the introduction into these places of the Spanish and laboring class of people. I hope in time and I have no doubt that, being convinced from the products and advantages which it would furnish to them, it would be possible to make of them even good laborers, as has been the result in other points of this archipelago, since, although at present they would not be available for the necessary interior laborers, they would be able to aid with a great service with their carabaos in the conveyance of the coal.

THE PORT.

Another of the great advantages that this exploitation presents is the port and anchorage, the first is composed of the island of Tiniguisan, with the mainland of Falave. This port, sheltered from all winds, and capable of receiving a numerous squadron, has about 15 fathoms of water, with a bottom of mud and sand. Its openings, one of which is toward the north and the other toward the east, make the entrance into this port easy with all the winds. Within this port is found the river or arm of the sea of Tagvajie, in which it is also possible for barks of light draft to enter, since, once inside, it is likewise of much depth.

CONSIDERATIONS.

With all that I have stated it is seen that the principal elements for a mining exploitation are found conquered at this point, since with a port, than which there

is none better, an accessible road and ease in extracting the coal, I believe that no one will hesitate to say that it is a fair business (proposition) and in it but little capital is necessary, only indeed the cooperation of well-informed persons and those who know how to appreciate the value of things.

Finally, I conclude, having made clear the advantages which exploiting there would have, that there is likewise the timber with which these places abound, and at the same time cultivating the great plain which is joined to the port, or better said, between that and the river, because of its being already cleared and able to be made into irrigated land with very slight expense.

Under date of June 24, 1874, he writes from Bacolod:

After the expedition to Calatrava and Falave, and seeing the excellence of that business, I have made haste to make the denouncement of two *pertenencias* in the last point and for which there exist in my possession the already known receipts; and in order not to delay so important a matter, I beg of you that you will be pleased to receive the power (of attorney) that on this date I execute in order that with freedom it will be possible to give this business the course which is most convenient, and in order that with your friends, and especially with Mr. Jose Centeno, it may be possible to give life to this matter.

I wish, and it is my will, that all my brothers share equally the benefits with myself in this matter, and therefore I desire the formation of an anonymous society, with the name "Viña Brothers," for whose foundation and good organization I ask you to make arrangements with Mr. Centeno, who is a skilled man in these matters, and who will no doubt accept this work.

No record appears in the archives in relation to the entry of Diego Viña, jr., from which we conclude that this particular entry was abandoned. From other sources we know that this same field was again examined in 1879. In 1893 another entry was made on these deposits and renounced in 1895. In 1896 there were three locations made on them by Martin Buck and Joaquin Casanovas y Llovet, and in due time the legal labor being completed, application was made for their demarcation for the purposes of concession, and these applications were pending when the Spanish-American war commenced. These bear the names of Nuevo Cardiff, Nuevo Cardiff 2d, and Nuevo Cardiff 3d, respectively, and are each for four claims. These belong, therefore, to the second-class claims, according to our classification of existing entries.

Through the courtesy of these claimants, who are residents and business men of Manila, we are able to give a comparatively recent analysis of the coal from these three claims:

NUEVO CARDIFF.

[Thickness of the vein, 15 feet.]

Ashes	3. 90
Water	6. 10
Hydrogen	2. 00
Oxygen	3. 00
Carbon	85. 00
Total	100. 00
Caloric power	6, 928

NUEVO CARDIFF SECOND.

[Thickness of the vein, 4 feet.]

Ashes	4.20
Water	6.80
Hydrogen	4.00
Oxygen	2.00
Carbon	83.00
Total	100.00
Caloric power	7,567

NUEVO CARDIFF THIRD.

[Thickness of the vein, 7 feet.]

Ashes	4.00
Water	10.00
Oxygen	6.00
Hydrogen	5.00
Carbon	75.00
Total	100.00
Caloric power	6,206

An opportunity will be given in a subsequent chapter to compare these assays with the assays of lignites of other countries, including the coals of Japan, and it will be seen that this combustible does not suffer by the comparison. In fact, the Philippine coals in general are not only equal to, but in many cases superior to, the best Japanese coal.

CHAPTER XIII.—SPECIAL REPORTS ON COMPOSTELA AND DANAO, 1871-1887.

The conditions prevailing in Cebu during the time of the "La Paz" exploitation (see Chapter XI) seem to require a more particular mention than will be found in the translation from the work of Mr. Abella in Chapter X. The industry in Cebu at this time was centered in the Compostela and Danao district, and becomes of special interest because of the extensive claims presented to-day by Enrique Spitz for these same coal lands, together with much other adjoining territory believed to be valuable for coal.

Briefly stated, on November 3, 1871, one Isaac Con-ui solicited two mines of four pertenencias each, giving them the names of "Caridad" and "Esperanza." In due time these were demarcated, and on January 10, 1873, they were regularly conceded. On July 22, 1873, one Pascual Veloso solicited three mines in the same district and of like size, giving them the names of "Santa Rosa," "Magallanes," and "Legaspi." Concessions were duly issued for these mines on May 23, 1874. Much interest was excited by these two enterprises in Cebu, and they received a full degree of government protection and assistance, but without

success, and on June 1, 1887, a notation was made on the records that this latter group of mines had been abandoned for many years. Directly afterwards these fields were again taken up by an association organized under the name of the "Sociedad Nuevo Langreo," and the titles gained by this association are still extant, being represented at this time, as we have said, by Enrique Spitz.

Mr. Isaac Con-ui was not less persistent in his applications for government aid and assistance than his competitor of the "La Paz" in Albay. In May, 1872, a survey for a wagon road was made at the government's expense from his mines at Dapdap to the Cove of Cotcot, where he proposed to ship his coal. Now, of course the building of roads belongs to the government, but the road proposed at that time was solely for the benefit of Isaac Con-ui, and as he attempted to have it constructed from provincial funds it is not strange that the provincial government of Cebu at that time was found protesting.

However, Con-ui prevailed, and on December 20, 1872, the governor-general, having determined that this road was one of general public utility, ordered it built from the provincial funds, taking an agreement from Con-ui that in the three years following the completion of the road he would pay back the cost in three equal annual payments. The road was built at a cost of \$6,195.80, and in 1877, after a long correspondence, the provincial governor secured an executive order requiring Con-ui to pay up, as he had agreed; but when the gobernadorcillo of Compostela sought Mr. Con-ui to enforce payment it was found that he had left that section and was reported to be in Manila. The money was never paid, and shortly after the state released Con-ui from the obligation to pay, it developing that the road was not really completed so as to be a practical road.

In 1887 he petitioned for an import duty of 10 per cent on foreign coal, endeavoring to have the import duty of 1861 on coal restored, which latter duty had been repealed in 1865, and this was refused in 1880 by the supreme Government.

The effort also to compel the navy to use his coal was also denied, because it was clear that the exploitation was on too small a scale to supply the needs. Nothing daunted, in 1879 he asked the state to construct a tramway from his mines to the coast, in return for which he agreed to supply the navy with coal at 4 pesos per ton. An investigation of his works disclosed that he was not putting enough of his own money into the enterprise to guarantee his good faith, and this, too, was denied. The works, however, were more extensive than previous exploitations, and after a careful examination of all the evidence I am satisfied that had the demand for coal been as large as at the present the money and work expended by Mr. Con-ui would have been sufficient to place his enterprise on a paying basis and independ-

ent of government aid. Owing to the present interest in the Danao and Compostela coal fields, we quote at length from the reports of that date.

REPORT OF ENGINEER ABELLA TO INSPECTOR OF MINES UPON CON-UI'S PETITION FOR
GOVERNMENT AID, MARCH 17, 1878.

To the INSPECTOR-GENERAL.

Upon my return to this city after having examined carefully the territory in the vicinity of the towns of Danao and Compostela, and therefore the mines of this latter town named "Esperanza" and "Caridad," the only ones which to-day are in exploitation throughout the whole island, the proprietor of these mines has delivered to me, as representative of the general inspectorate, a communication addressed to the most excellent governor-general of the archipelago, soliciting aid and protection from the State for the development of the industry which he has commenced (a development which he has no doubt of being able to accomplish ultimately), in constructing the road which is to unite the mines with the coast, and which will assure an outlet for his products in case the steamships of the naval stations of Cebu and Zamboanga are supplied with these products. This petition is based upon the spirit and letter of repeated royal orders, which have been issued by the supreme Government concerning this matter and on the friendly spirit which the governor-general of these islands has manifested toward the coal-mining industry, employed up to the present time exclusively and in a special and decided manner for the benefit of mines of the same kind in southeastern Luzon—a spirit which the petitioner desires to see extended to his mines, situated at the two points already mentioned, in the complete construction of the road to the coast and the sale of his products to the ships of the State. The undersigned engineer within the bounds of his official knowledge is entirely unaware of the example just cited by the proprietor of the Compostela mines, although the publicity of certain documents has made known to him that which is not unknown to the majority of the public of these islands; but, regardless of this example, he does not doubt, nevertheless, that it constitutes a precedent which should favor the petitioner whenever the case is similar, since under the circumstances, perhaps not more favorable as regards the seniority of titles, the situation nearer the central portion of the archipelago can be shown by him. The history of the slow development of these mines until their arrival at the present state of exploitation is better known to your lordship than to the undersigned, since you assisted, I may say, in the birth of the same, making the demarcation and examining them in the month of November, 1871. Neither is it unknown to me that in 1873 the titles of ownership were issued, and that in the same year trials of the coal were made, first in the gunboat which made a voyage from Compostela to this city and afterwards on a larger scale in the steam war ship *Marquis de la Victoria*, and in the arsenal of Cavite, the favorable results which were obtained being published, by superior order, in the Gazette of July 19 of the same year. In spite of these trials, which assured to a certain extent the only market which can be obtained to-day by the native coals, demonstrating practically its advantageous application in steam navigation, nevertheless there remained the culminating difficulty of the transportation across a very broken country, having to cross hills, valleys, and gulleys without even a poor road, this constituting a disadvantageous circumstance little less than insurmountable for a private individual, in view of the $2\frac{1}{2}$ leagues of distance from the mines to the nearest point of the coast. In view of these circumstances the proprietor of the mines was granted the construction of a road, the province furnishing him with the extra *polistas* from the neighboring towns, requiring of the concessionary the maintenance and implements which they required, the concessionary binding himself also to repay, at the expiration of a certain length of time, to the local funds the

value represented by the polistas which might be employed. This favor, conceded in 1872 under the name of a protection, although it was in itself nothing more than a mere advance (loan), has not produced up to this time the completion of the road, which is found to be in such condition that the transportation is yet very expensive, and they can not receive the development which they might have been able to acquire if the working of the mines should have been made from the first in accordance with the requisites of science. The experience acquired in the coal-mining enterprises of this island has been that of fatal results, by reason of the discouragement which all feel from the great amount of capital which must be invested in roads and other exterior works before commencing the real working of the mines, which they then abandon in a little less than a virgin state. •This fact, notoriously known, and more particularly by your lordship, who has indicated it in public documents after having proved this on the ground itself, demonstrates theoretically that the miners should limit themselves to the execution of the works which constitute the real working of their claims, cutting off those other costly works which exhaust their resources. But the question being resolved in these terms: Is the exploitation of the mines possible? What would the cost of the combustible be, placed at the coast? In the total cost of the coal placed on the coast there would figure in an enormous and inadmissible proportion the amount consumed for the cartage or transportation, and that which could be transported would never be of any consideration nor of such importance as to remunerate the fatigue of the miner, who must count upon a profit which highly repays his toil in view of the fortuitous character which the products of the mining industry always have. It is, therefore, entirely impossible to make any exploitation of combustible in this island without means of communication, efficient and cheap, and these means, which by reason of their general character and expense can not and should not be executed by the mining enterprises, whose resources are needed for employment in the preparation and profitable working of their deposits, but should be executed by the State whose interests will thereby be benefited, since in addition to encouraging and creating new industries in the country it will cause the development of the exploitation of forestry and agricultural products, adding to the general welfare and wealth. Nevertheless, the undersigned engineer understands the State can not, neither should it, accede to the first petition which in this sense may be made, and that it is necessary that the richness and importance of the industry to be developed shall be fully established, in order that the sacrifices it may make, if the creation of convenient and inexpensive means of communication can be called such, shall be amply compensated by the wealth which the industry creates, and by the direct advantage of the nation having at its disposal native coal without depending upon the foreign supplies.

With this object I will briefly and in a few words state the circumstances of the quality of the coal and of the arrangements of the veins, deducing therefrom their probable future. Having executed the plan of the interior works in relation to the outcroppings, a map or plan and a slight explanation would be, without any doubt whatsoever, the best description of the present state and the future of said mines; but not having the time at my disposal indispensable in order to set forth the data which I possess, I will limit myself to an extract from them in this report, completing them in due time in compliance with the commission which has been conferred upon me. Within the eight pertenencias of the two mines, Esperanza and Caridad, situated at the upper part of the valley of Dapdap, there appear numerous outcroppings which belong to two distinct veins which run from NNE. to SSW. and incline from 30° to 50° toward ESE., with a thickness which is never less than 0.80^m nor more than 1.30^m. The coal of both veins is very similar, slightly bituminous, hard, noncokable, almost entirely free from pyrites, not very old, probably metamorphous, although practically applicable to combustion in marine steam engines, which constitute, as has been shown, the only application to which the native coals can to-day

be put, whatever their age or properties of combustion might be. The works executed up to the present time are of no great consideration. Excepting the various abandoned works and those of investigation without fixed plan, there exist to-day three galleries, which constitute two levels of exploitation, whose profitable working has been commenced, although on a small scale, since in five years of working there have been sold only some 1,600 tons of coal, enabling a calculation of approximately a total output of little more than double this amount, by reason of the natural waste of the worthless material produced, most certainly in slightly considerable quantity.

In order to open the three galleries the natural inequality of the valley of Dapdap has been taken advantage of, although not entirely, since the lower gallery has not been placed at the lowest part of it included within the pertenencias, in which case there could be counted on an average altitude of 100 meters, or a future of easy and cheap exploitation before commencing the more costly work of sinking shafts below the level of the outcroppings farthest down. The lower gallery is 176 meters; the intermediate one which communicates with it, ventilating it, is 40 meters; and the upper one, which is ventilated from the surface by means of a chimney, is 145 meters, opened on the second vein of the east side. It follows, then, that in both veins there is a total of 361 meters opened in coal; some 60 meters of fruitless work in crosscuts for investigation; examinations, in the sense of inclines, 13 meters in that of the west side, and 50 meters in the second of the east side, and some drifts for profit in both; in all of these labors there is to be observed a regularity and constancy in the character of the coal and the conditions of arrangement, which permit of hopes of a very probable flattering future, and allow, and even counsel, the commencement of an active and regular development, counting on the resources indispensable for this object, and with good transportation facilities to the point of embarkation. These conclusions justify, then, fully the importance of these deposits of coal, an importance which is amply sufficient to advise the completion of the highway, which will place them in easy and direct communication with the coast, above all if there be borne in mind the friendly interest which the Supreme Government has always manifested toward this industry.

As regards the proposal that the ships of the State in the stations of Cebu and Zamboanga consume the Compostela coal, the undersigned engineer also believes this justifiable whenever, aside from that which may result from the analyses and tests in the laboratory which should be made in the general inspectorate, the navy shall have made experimental trials of said coal for itself in some of its ships, and it proves to be applicable for its purposes, and the proprietor promises to sell said coal at advantageous prices as compared with the cost of foreign coal in this market, thereby proving clearly and definitely real advantages for the interests of the State, which in addition to obtaining for its use native coal of profitable application, and much cheaper than those which at present are generally consumed, will create and develop an important industry and thereby a wealth which will assist more or less in the early increase of the revenues in various ways.

Lastly, before concluding, I should state that upon receiving the petition and making report thereon to your lordship, I have borne in mind various circumstances. In the first place, the constant protective spirit which the Supreme Government has manifested in favor of the development of the industry which we represent in this archipelago, a spirit which advises the reception and encouragement of all those proposals which are conducive to that end, above all if they are based upon good principles of justice and general convenience. In the second place, your lordship knows, better than the undersigned, that this is not the first expediente which the general inspectorate of mines has begun in favor of the coal-mining industry of this same island of Cebu, since in 1863 there was instituted another analogous one entreating the comandancia-general of the navy to revoke an order which condemned the infant coal-mining industry of this island. Lastly, I could not do less than take

very greatly into account the constant watchfulness which your lordship, as chief of this department, has manifested at all times in favor of its development, and therefore I attempt, although poorly, to interpret the friendliness of your lordship, admitting and forwarding to you the foregoing petition. Nevertheless your lordship will decide that which is most opportune.

Cebu, March 17, 1878.

ENRIQUE ABELLA Y CASARIEGO,
Chief Engineer of the Second Class.

CON-UI'S PETITION FOR CONSTRUCTING A TRAMWAY AND REPORTS THEREON, APRIL-
NOVEMBER, 1879—PETITION OF DON ISAAC CON-UI.

To the Most Excellent COMMANDING GENERAL OF THE NAVY:

Don Isaac Con-UI, proprietor of the coal mines of Compostela, most respectfully states to your excellency:

That the most excellent governor-general of this archipelago has been pleased to issue, in the expediente instituted at my request concerning the opening of a highway, the decree by which it is ordered, among other things, that the highway, for the opening of which I petitioned, be finished with personal service labor, since the said highway has been declared to be of public utility and convenience. This expediente, the highway having once been completed, makes it possible to furnish the coal which is needed for the navy of this station, and other departments of the State, at \$5 (pesos) per ton delivered at the harbor of Compostela. But, being desirous that the State obtain the greatest advantages possible, I appeal to your excellency, showing that in case the State were to construct an iron tramway for the conveyance of the coal from the mine to the harbor, your petitioner will be able to furnish said coal at \$4 (pesos) per metric ton, delivered at the harbor. The petitioner submits the aforesaid propositions to superior consideration in order that, if they are believed to be acceptable under proper conditions, you may be pleased to provide whatever your superior knowledge believes appropriate for the realization of the indicated purposes, and, therefore, I beg of your excellency to approve that which is asked if, in your superior judgment, you deem it proper.

Manila, April 16, 1879.

ISAAC CON-UI.

DECREE REFERRED TO IN THE PRECEDING PETITION.

The most excellent governor-general of these islands has been pleased to decree the following on this date: Having seen the expediente instituted by Don Isaac Con-UI, petitioning that he be exempted from the payment for materials and day laborers employed in the opening of a highway which, commencing from the mines belonging to him, called "Esperanza" and "Caridad," jurisdiction of Compostela, district of Cebu, terminates at the cove of Cotcot, and to the payment of which he is obligated by the superior decree of November 18, 1872; having seen the reports of the chief engineer of the corps, Don Enrique Abella, the reports of the directorate-general of civil administration, and of the council of administration; and it appearing that the highway referred to was declared in the said superior decree of November 18, 1872, to be of public utility and convenience; it appearing from the trials made in the arsenal of Cavite and on board the steamer *Santa Filomena* that the coal from these deposits unite excellent qualities of combustion and calorific power, the comandancia general of the navy having decreed the purchase of said coals for the use of all the ships of this station by which there is obtained an immense economy in favor of the interests of the State, because of the excessively high prices reached by foreign coals here; there existing sufficient justification for the necessity of arranging and terminating the work upon said highway, which will facilitate the conveyance of the combustible

to the point of embarkation; in consideration of the spirit of protection which the Supreme Government has constantly manifested in favor of the development of the mining industry of this archipelago, the said fortunate concessionary ought to be relieved of all payment, both for the materials and for day wages referred to in the superior decree of 1872, which were used in the construction of said highway, and which road tax may not have covered. Considering, lastly, that this protection counsels that all those measures which are conducive to this end be received and encouraged, and above all, if they are based upon solid principles and general convenience, as are the present ones, this General Government, in entire conformity with the said council of administration, and with the proposals of the directorate-general of civil administration, and having seen section 5, article 9, of the superior decree of December 20, 1876, has decided to decree the following: First, that Don Isaac Con-ui be exempted from all obligations for the repayment to the local funds which was imposed upon him by the superior decree of November 18, 1872, on account of the work of opening the highway which unites the mines belonging to him with the cove of Cotcot. Second, availing myself of the powers conceded to me by section 5, article 9, of the said superior decree of December 20, 1876, proceed with all haste to the execution and termination of the said highway, with the aid of the road tax and with the funds of the province, by reason of the fact that said highway has been acknowledged to be of public convenience and utility. Third, and lastly, the politico military governor of the district will most effectively see to it that these labors be made with the greatest regularity and promptness, employing for this purpose the greatest possible number of polistas in order that the towns in the immediate vicinity enjoy, as soon as possible, the immense benefits which it will bring them, and that at the proper time the transportation of the coal from those deposits to the place of embarkation be facilitated, faithfully interpreting the spirit of the Government toward all coal-mining industries in these islands. Transmitted to you for your information and for compliance therewith.

JOSE CAVESAS DE HERRERA.

OFFICIAL COMMUNICATION OF THE COMMANDANT GENERAL OF THE NAVY TRANSMITTING THE PETITION OF CON-UI TO THE GENERAL GOVERNMENT.

MOST EXCELLENT SIR: The proprietor of the coal mines of Compostela, Don Isaac Con-ui, has forwarded an exposition to the department in my charge, by means of which he offers to supply the navy with said combustible at the price of 5 pesos per ton, delivered at the harbor of the said place of Compostela, as soon as the work upon the highway directed to that place is finished, and which price he binds himself to better, lowering it to 4 pesos, in case there be constructed an iron tramway, on account of the State, for the transportation of said coal; and as such offers should merit consideration, in view of the immense benefit they would bring to the State, I have not hesitated in bringing the matter to the attention of your excellency, including the aforesaid exposition, for the effects which they may produce in that Government, so worthily in your charge.

Manila, April 17, 1879.

JOSE POLO DE BERNADE.

To the Most Excellent GOVERNOR-GENERAL OF THESE ISLANDS.

FIRST REPORT OF THE INSPECTORATE OF PUBLIC WORKS.

MOST ILLUSTRIOUS SIR: The most excellent commanding general of the navy has forwarded to the most excellent governor-general, with an official communication of April 17 last, an exposition which has been directed to him by Don Isaac Con-ui, proprietor of the coal mines of Compostela (island of Cebu), manifesting: That the termination of the works upon the highway which unites said mines with the cove of

Cotcot, having been ordered by the Superior Government, he is willing, when said highway shall be completely finished, to give the coal which may be needed for the navy or for any other department of the State, at the price of 5 pesos per ton, delivered at the wharf of Compostela; but, being desirous that the State obtain the greatest possible advantages, he would reduce said price 1 peso, or, that is, would sell each metric ton of coal for 4 pesos, if the State would construct on its account an iron tramway for the transportation of the coal from the mine to the harbor. The most excellent commandante general of the navy expresses in his official communication the view that such offers merit consideration, by reason of the immense benefit which would accrue to the State, for which reason he brings the matter to the attention of the most excellent governor-general, including the petition, for ensuing official action. As the first step in this matter your most illustrious lordship has been pleased to remit it originally to this inspectorate for a report thereon, and in consequence thereof I have the honor to show: The department under my charge only knows of the existence of the coal mines of Compostela, and the result of the tests made with their coal in the ships of the State, by the notices made in the press of the capital; but, this matter being foreign to this department, it has nothing to show regarding this enterprise, inasmuch as it is a beneficiary of the Government in the terms expressed in the superior decree which the interested party incloses a copy of. From which said decree, which does not appear officially in this inspectorate either, it appears that the public utility and the convenience of a road constructed from the mine to the cove of Cotcot, or, which is to be deduced therefrom, to the point of embarkation, has been declared by the Superior Government; that for the construction of this road the proprietor of the mines, Don Isaac Con-ui, is exempted from all responsibility; as to the class of such responsibility I am for my part also unaware, but without doubt it has been incurred and on behalf of the construction which has been heretofore made; and, lastly, that the works upon said highway be ordered completed with the greatest speed, and employing the road tax and the funds of the province "as much in order that the towns in the immediate vicinity enjoy, as soon as possible, the immense benefits, as that it may facilitate the transportation of the coal to the point of embarkation." It follows, therefore, in view of the facts supplied by the attached incident, that the Government, while favoring the general interests of certain towns of Cebu, since the road in question has been declared of public utility and convenience, also favors the interests of the proprietor of the mines of Compostela, who will transport his coal over the said road; and, I feel sure that this measure is of the highest importance for the enterprise, known as it is by all, that the methods (roads) for hauling are the difficulties of greatest importance for exploitations in business enterprises of this class. Mr. Con-ui, knowing without doubt the benefits which the highway in question would bring it, and at the same time enable the placing of his coal, offers to give the same to the State at the price of 5 pesos per metric ton, delivered at the harbor, which fact favors, as I understand, in a manner also very important to the interests of the State, since the military marine is the greatest consumer of this combustible, it had to pay a much higher price for foreign coal. It would appear, then, up to here, most illustrious sir, that if the State and even the general interests should commence, perhaps shortly, to enjoy the benefits which should result from obtaining the coal at the indicated price, the owner of the mine enjoys in exchange the advantages which correspond from the establishment of a road connecting the mine and the harbor, without any expense whatever on his part. It is not to be doubted that public action has done all that corresponds to the general interests and to the individual owner of the mines. This latter, nevertheless, understands the desirability of perfecting the methods of transportation, and in his petition proposes that in exchange for the construction of a tramway from the mines to the harbor he will reduce to the State by 1 peso the price which he has fixed on each metric ton of coal. The State, as has been stated, has conceded no slight protection to the

mine, constructing on its account the existing highway and making provision for completing the same with the greatest rapidity, so that the propositions of Mr. Con-ñ must be considered purely and simply under the point of view of the advantage which it may bring to the State in the consumption of coal in the expense which will be caused by the construction of the tramway; that is, whether this expense will amount to more than the economy it offers in the price of the combustible.

The character of this subject being fixed, such as it is understood by this general inspectorate, there follows the immediate necessity of taking into account various considerations, the first of which is undoubtedly the annual consumption of coal from Compostela which can be made by the navy. This information is not furnished by the official communication of the Comandancia general, with which has been remitted the petition of the proprietor, and although it may appear in some other expediente, as, for example, that in which has given rise to the construction of the highway, as this is unknown to me I am unable to set it forth here and I deem it indispensable that your most illustrious lordship be pleased to obtain the same again. This information is most important as a point of commencement for the successive study of the advantages of which we treat hereafter, because, as has been said before, and which moreover is well known, the navy will always be, above all the institutions and establishments of the State, that which will consume most coal. This measure having been touched upon, this inspectorate under my charge can immediately proceed to a calculation, in an estimate upon the ground, the cost of the tramway which is desired, and the comparison between this information and that which the economy of 1 peso per ton of the combustible which the navy uses will give, with which can be formed a sufficiently exact idea of the advantages to be gained by proceeding with or not proceeding with the construction which is proposed. Another kind of consideration must be considered also: The extension and richness of the veins which are being exploited at Compostela, and even the means or resources with which the proprietor counts for the exploitation. He does not fix any certain length of time whatever for the duration of his agreement, and even when the lack of this detail permits it to be taken in the sense of unlimited permanency, this same fact may favor him in case of immediate abandonment of the exploitation for lack of means. Treating of the interests of the State which must be employed in exchange for the advantages, it is not prudent to compromise them in speculations but little guaranteed. The State would certainly gain nothing by constructing the tramway from the mine to the cove of Cotcot if the mine resulted unproductive or was not exploited in a short period of time, and it would make null the benefit in price which is taken as a base for the execution of the works. In order to guarantee the capital which the State may employ in the construction of the tramway, it is necessary to guarantee, first, the duration of the advantage which is offered it, since the tramway is not a work of general interest and consequently of public utility and convenience, and it is well established in this report that it is to serve exclusively for the hauling of the coal from the mine of Compostela. This is the opinion of the general inspectorate under my charge.

Manila, May 14, 1879.

MANUEL RAMIRES.

To the Most Illustrious DIRECTOR-GENERAL OF CIVIL ADMINISTRATION.

OFFICIAL COMMUNICATION OF THE DIRECTORATE TO THE COMANDANCIA GENERAL OF THE NAVY.

MOST EXCELLENT SIR: This directorate, in accordance with the report and proposals by the general inspectorate of public works, the cause for which was the propositions by the proprietor of the coal mines of Compostela, which your excellency was pleased to forward to the most excellent governor-general of these islands with an

official letter of April 17 last, I have the honor to again direct to your excellency the said matter in a request that for its proper determination you may be pleased to direct that there be shown in the same the annual consumption of the combustible from said locality which may be made in the ships and the service of the squadron. So that if the said proprietor should extend to private individuals the advantages in price which he offers the State, and in order that then there could be borne in mind the benefit which general interests might also obtain from it, it would be most convenient to know likewise the calculation of the coal which the merchant marine of this archipelago consumes, as also the very illustrious opinion of your excellency on this and other particulars which present themselves, in aiding in the most exact appreciation of this subject. God protect your excellency many years.

Manila, May 16, 1879.

J. C. DE HERRERA.

To the Most Excellent COMMANDING GENERAL OF THE NAVY.

OFFICIAL COMMUNICATION OF THE COMANDANCIA GENERAL OF THE NAVY.

MOST ILLUSTRIOUS SIR: All that refers to the national coals being of the greatest interest for the navy, as much on account of its price and the notable economy which it would bring to the State as on account of political considerations, I ordered the immediate compliance with that which was requested of this department by your most illustrious lordship in your official communication of the 16th of the month last past, regretting the delay in replying which was occasioned by the difficulty in obtaining the information relative to the navy and the merchant marine. According to data scrupulously obtained it can be calculated with sufficient approximation that the steam merchant marine consumes 26,000 tons annually. The navy, in the three fiscal years of 1875 to 1876, to 1877, and to 1878, has consumed 24,383 tons of coal, of which 22,121 tons were for the ships and 2,262 for the arsenal and the stations. These quantities show an average annual consumption of 8,128 tons, which will most certainly not be that of ordinary times, because those were the years of the blockades and hostilities of the squadron at Jolo and Tavi-Tavi, the campaign of Jolo, and its first occupation. It is sufficient for me to add in returning the expediente that, taking the greatest interest in this matter, I desire to aid your most illustrious lordship with all the information and data which you may believe will assist you on my part. God protect your most illustrious lordship many years.

Manila, June 9, 1879.

RAFAEL R. DE ARIAS.

To the Most Illustrious DIRECTOR-GENERAL OF CIVIL ADMINISTRATION.

SECOND REPORT OF THE INSPECTORATE GENERAL OF PUBLIC WORKS.

MOST ILLUSTRIOUS SIR: The most excellent commanding general of the navy, complying with that which your most illustrious lordship was pleased to request of him in your communication of the 16th of May last past, has returned the expediente relative to the construction of a tramway on account of the State from the coal mine of Compostela to the cove of Cotcot (Cebu), showing: That according to previous information gathered with great care, it may be calculated with sufficient approximation that the steam merchant marine consumes 26,000 tons of combustible annually; that the navy has consumed during the last three fiscal years 24,383 tons, which gives an average consumption of 8,128 tons annually, although this average will not be the ordinary one because during said period occurred the blockade and hostilities of the squadron at Jolo and Tavi-Tavi and the campaign of Jolo and its first occupation. There is shown, therefore, most illustrious sir, in this expediente the important and necessary information which I requested in my first

communication, and which I consider to be the base for the economic study which should be made of the proposal of Don Isaac Con-*ui*. It follows, by virtue thereof, that the maximum consumption of coal made by the navy of this station, under circumstances of great activity by the squadron, is limited to 8,123 tons. It is not an easy matter for this inspectorate to determine what would be the amount of the ordinary consumption; but it believes that there may be accepted for such, in round numbers, as a basis for calculations, the quantity of 8,000 tons per year, feeling sure that this calculation will certainly not be prejudicial to the proprietor of the mines. The advantage which Mr. Con-*ui* offers in exchange for the construction of the tramway he limits to the State, and therefore the consumption of the State is the only consideration which, for the time being, must be taken into account. This advantage can now be determined, and, as we have seen, is appraised at 8,000 pesos a year, a sum which, as the official interest on the money, represents a capital of 100,000 pesos. Thus it is, then, that it is known that by the State entering into the construction of the tramway proposed, employing 100,000 pesos, it will obtain the corresponding official interest on the same through the economy of 8,000 pesos, which will accrue to it in acquiring the coal for the navy. If the proprietor would make his offer more extensive to the merchant marine, and in consequence a benefit to the general interests, the matter would present a subject for greater consideration and study, and the State could determine up to what point it should continue favoring the enterprise in exchange for the advantages which said interests would bring. As individual action it is not possible to subject to the same calculations as that of the State, we can neither venture to suppose that the merchant fleet would supply itself exclusively with the coal from Compostela; much less reason would we have for imagining that, given the advantage in price offered to the market, the combustible from that locality would be consumed even as much as a third part of that which is employed each year by the merchant marine; or, although it were only an equal number of tons with that number which has been supposed for the navy, in this case we would have another 8,000 pesos of interest, enabling us to increase the amount employed in the construction of the tramway by another 100,000 pesos, which is the same; moreover, this calculation is at least very premature, and I only set it forth here in order that I fail not in treating of any of the measures advanced by your most illustrious lordship and so concretely answered by the comandancia-general of the navy. The inspectorate under my charge could then proceed now to the study of the work which has given place to the orders concerning this expediente; but the prudence with which it is proposed to treat of this subject obliges this inspectorate to advise your most illustrious lordship beforehand that it deems best to acquire first the technical and economical report of the inspectorate-general of mines. In the latter part of my communication of May 14, I showed to your most illustrious lordship that it was not enough to take into account the question only mathematically of the advantages which the State and the proprietor of the mine may obtain. The first thing that should be known is as to the conditions of said mine and the guaranties which, in favor of his agreement, Mr. Con-*ui* presents—guaranties which to-day are reduced to his good faith and his word, which for my part I accept. The aforesaid inspectorate has made a study of the coal banks of Cebu, and the mineral and geological report which it published by royal order in 1876 proves, in the first paragraph, on page 35, that the outcroppings of Compostela are not unknown to it. Since that date the exploitation of those outcroppings has been continued, and the inspectorate of mines, on its part, having at this time an engineer of the department destined for that district, so that the State can be informed with due exactitude as to the future which the mines of Mr. Con-*ui* offer, the works which have been done during this time, the elements of exploitation, and the good service with which it counts, and even those which it can command in the future, in order to guarantee the State, by means of a faithful compliance, the capi-

tal which this latter may employ in the construction of the tramway. The best management of the public funds requires all this, most illustrious sir, and the bare proposition of Mr. Con-ui, which heads this expediente; for, it should not be lost to view that if to-day the coal-mining industry solicits advantages and protection on the part of the State, and this is conceded to the first enterprise which requests the same, we should also recognize in the future the same right, at least, to other industrials that may institute the denouncement of new districts. The inspectorate of mines will illuminate, without any doubt whatever, this expediente with an exact report, conscientious and voluminous, in order that it may contain important information, which will guarantee the final determination which is adopted by the State, and it may perhaps also furnish plans and sections of the mine, and of the ground which lies between this latter and the cove of Cotcot, which documents may serve, perhaps, for making the study of the tramway. I propose, therefore, to your most illustrious lordship, that you may be pleased to submit this matter to said inspectorate, with complete authorization to extend its worthy opinion on all the measures which, under any point of view, it believes should be taken into account for the better and more complete determination of the matter. Your most illustrious lordship will decide.

Manila, June 16, 1879.

MANUEL RAMIRES.

To the Most Illustrious DIRECTOR-GENERAL OF CIVIL ADMINISTRATION.

REPORT OF ABELLA TO INSPECTOR-GENERAL OF MINES, JULY 24, 1879.

To the INSPECTOR-GENERAL:

As soon as I received your attentive communication, dated the 26th of last month, with a copy of the expediente, instructed by the general directorate of civil administration in regard to a proposition from Mr. Isaac Con-ui to furnish his coal to the State at \$4 per ton in exchange for the construction of a tramway from the seashore to the mines, I started on my way for these purposes: With the object of examining them and seeing the progress which they have made in the sixteen months that have elapsed since my first and former visit, in which certainly the State, always kindly disposed toward the coal industry of this archipelago, granted to the mines we are treating of a condonation of payment on the road, offering to finish it on its own account, having beforehand completed an official test of their coals on a large scale, both in the arsenal and in the vessels of the navy, and, lastly, offering in a recent royal order to consume exclusively national coals. These are motives more than sufficient to encourage any enterprise or concessionary of mines, and therefore it was reasonable to suppose that the Compostela mines had realized a very visible progress in their organization and workings. Finding myself morally obliged to perform the surveyance mentioned even if in your attentive communication, formerly mentioned, your lordship had not already indicated to me, to a certain extent, this line of conduct.

In regard to the manner of showing all the data which the general inspectorate of public works in its very illustrious report wishes to know, it seems proper to me to insert here the opinion which I gave in an expediente commenced by the same Con-ui in November of last year, inasmuch as I showed therein the condition of the mine and the probable future that it might possess, inserting in suitable places the improvement or retrocession which I have observed in my last visit. In this manner the progress, if there is any, and the present organization of the mines will demonstrate what can be expected in the future and the guaranties that the Compostela mines may offer to the State.

By referring to my data on the studies of my first campaign in this island, I said in my report just mentioned:

“Therefore, selecting from the data I have collected those more directly relating

to the object of this opinion, let me begin by giving a brief idea of the petitions and vicissitudes that the coal area of the town of Compostela has had in other times; afterwards describing them slightly from a geological point of view, and with more details from an industrial mining light, in relation to their works, their combustible layers, and the chemical and mineralogical properties which they present for immediate and useful exploitation.

"The coal formations of Danao were already known, at least since the year 1852, and they were anciently embraced also in the jurisdiction of the town of Compostela. They were petitioned for seven years after the first registers of the area, to-day occupied by the mines of this town, and, although they were again petitioned for in 1866, neither of the two petitions were granted for purely legal reasons, furthered probably by the same interested party. In 1871 its present proprietor petitioned for them in two contiguous registries, Esperanza and Caridad, each one for four claims, which were officially surveyed at the proper time, and the corresponding titles of property were granted to him in 1873.

"In the former year there had been already conceded the construction of a road from the mines to the Compostela road, and in the same year in which the titles of property were granted to him took place the first official tests at the Cavite arsenal and in several war ships, which testimony the interested party exhibits in this expediente.

"Since that time, then, they commenced to work the mines, and though their present condition certainly does not expose a suitable return for five years of work regularly sustained, this slowness can be explained by several social reasons; by the embarrassing economic penury that a single proprietor had to meet; and, above all, by the culminating difficulty upon which the attempts of the coal industry in Cebu have been dashed to pieces up to date—the difficulty of the land transportation necessary and indispensable, taking into consideration the interior location of all the mines in the island.

"These we are treating of are located on the southwest brow of the Mount Licos, along the creeks Dapdap and Sugui, in a broken ground made up of lime, clay, and conglomerates of several kinds, in overthrown and lifted layers, as metamorphosed by the volcanic rocks which are found on both sides of this formation, and even insinuating themselves among some of the strata which form it. Its age, though not yet perfectly distinguished on account of the scarcity of true characteristic fossils, must, by those found up to date, be counted between the Miocene of the Tertiary period and the Cretaceous of the Secondary, both inclusive, and therefore it can be affirmed that coals which are found in this formation are not coals, properly so called, which are formed only in grounds of the same name (primitive period or of transition), but Tertiary lignites, or, at the most, Secondary, very modern, though by their appearance and quality they have acquired the name of perfect lignites.

"Hitherto there are three strata that have been discovered within the claims Esperanza and Caridad, being revealed in the first instance and very especially on account of the numerous outcroppings that are seen there, since the more important works are only performed upon two of them.

"Having studied the thickness of these layers upon the outcroppings, it can be believed that they vary between 0.40 m. and more than 2 m.; but wherever you choose to examine the works that are executed the thickness has never exceeded 1.40 m., and this must arise from the supposition that they have been doubled in some points, making an apparent thickness that would, aside from this accident, always be found to be smaller.

"The directions and inclinations that affect both the coal layers and those of clay and sandy stones among which they are found are rather changeable, as can be understood remembering what I have just stated upon the influence which the igneous rocks have exercised upon all of them, raising this formation, giving it at first

sight an appearance of antiquity which it does not in reality possess. However, there can be established as conditions of more frequent occurrences within the claims an average direction from NNE. to SSW. and an inclination generally comprehended between 30° and 50° to the ESE.

"The works executed within the perimeter of both concessions are of two kinds—works of isolated surveyance, without order or fixed plan, at the present abandoned; and works kept up and which are actually at one and the same time for prospecting purposes, for preparation, and for profit.

"A drain and a shaft, fallen in for a large portion close to the point of commencement of the claims of the mine Caridad; a gallery, also fallen in, close to the mouth of the creek parallel to Ginagdanan; a shaft located in the bed of the creek Sugui, and some prospect holes on the upper part of this same creek constitute the works of the first class, all of short extension, abandoned, as we have said, and therefore inaccessible, and that can prove nothing to-day, though when they were opened they might have indicated something, because they were made in the vicinity or upon the same outcroppings of the strata of combustible.

"The works kept up at the present are made upon two of the three strata whose existence, we said, could be included within the claims.

"Over the strata which could be called the western there has been opened, taking advantage of the unevenness of the ground, two galleries, one (A) below for transportation and extraction, and the other (B) aiding ventilation, that communicate between themselves, almost, by two chimneys (C) (D), which follow approximately the inclination of the strata; and I say almost because, although the second did not have communication, yet when I drew the sketch of these works (month of February), however, it reached the same longitude as the first, and would communicate very soon. Besides these there exists another chimney (C), which becomes visible at the arroyo, but which is already of no use and remains closed in order not to prejudice the ventilation. The length of the lower gallery, which is entitled Esperanza, though it is opened in the mine Caridad, is 176 meters; that of the auxiliary, 49 meters; and between the three chimneys they make a total of 37 meters approximately. (See Pl. III.)

In the gallery Esperanza two transversals of surveyance have been opened, that of the west of only 5 meters, in round numbers, and the eastern of 50 meters in length, crossing the sand and clay strata which are seen with detail in the cut (fig. 5, Pl. III). In its back part there has been found indications, but very confused, of the course of other layers (fig. 3, Pl. III), whose outcroppings are shown to the east of the creek, and upon which have been executed the other works which we are about to describe.

"Lastly, between the galleries of direction, Esperanza and the auxiliary, there have been opened some cuts for products, arranged for in advance, which have furnished a part of the contingent of the up to date scarce production of these mines. It is sufficient to take a glance at the longitudinal projection of these works (fig. 4, Pl. III) to be convinced that these cuts of exploitation have been opened very prematurely, inasmuch as, if the maximum of extraction should be wished, the workmen who could find room to work would be very few, and the small bulks that are prepared would be exhausted."

The state in which I have recently found the works of this strata is rather short of praiseworthy. Upon entering the main gallery a great number of bents of rotten props were seen, eaten away by white ants, broken or out of place; the ledges (timbers) of the roof and on the sides also broken and rotten in great number; the scales of the roof and of the front, which cause those breaks, threatening to fall in places where they had not already bulged out, forming dangerous caves, whose rubbish choked up the drains and pavement, entirely flooded by the abundant filtrations, very natural in this monsoon, which, besides gazing upon the numerous cobwebs interwoven in

the timbers, increased the grief of this sight, giving an appearance of neglect and premature age to this gallery, which on the former year I had found in excellent condition. The remaining excavations were more or less in about the same condition, the appearance having been improved only a trifle by those things not mentioned in my former examination, and which are marked in red color on the corresponding sketch. (See Pl. III.)

These consist in an advance of 16.58 meters of the main gallery; in the lengthening of the chimney D up to the surface, with 19.50 meters of new excavation, and in the opening at the extreme east of the transverse of a gallery of 23.50 meters; and of a chimney, not finished, of 14.30 meters, opened at 3.20 meters of the mouth of this last gallery. The cuts have been extended to the north, which is shown in the sketch, and projection represented in red lines. (See Pl. III.)

In the layer which might be called the central, whose outcroppings have been shown in the sketch and whose indications have been found in the back part of the eastern transverse [gallery] of Esperanza there has been opened another gallery, E, called Caridad, which is ventilated only by the chimney F and others smaller, some of them really narrow passages which do not come to the surface, but communicate with it at a distance from all the cuts, and which can be seen in the plan, as well as in fig. 6, Pl. III, with full detail.

The gallery Caridad is 145 meters long, the ventilation chimney 53 meters, and the total of all the chimneys and narrow passages already mentioned about 86 meters.

In this deposit are also seen labors executed for profit—as premature as those of Esperanza—since, although by a special disposition of the laborers these reach a greater extension, the exploitation of the cuts being extended in a regular manner and without intermission very soon would be expanded, so that they must be suspended by arriving at the limit of the transportation gallery, whose advance necessarily has to be much slower than the advance of the cuts.

The conjunction of these works presented on my last visit a sight still more painful and deplorable than that of the gallery Esperanza, because, in addition to the circumstances which I have indicated in this, I found two points of the course of the transportation gallery entirely impassable on account of the rubbish and the projecting sharp angles in it by reason of the broken timbers, which made the passage rather dangerous and difficult. Besides, of the numerous narrow passages that exist from the cuts to this gallery many of them have fallen in, destroying the security which the workmen ought to have.

Regarding the advance of these works during the course of time between my two visits, these are reduced to an advance of 11.90 meters from the main gallery, and to the opening of a new upper gallery toward the north, connecting with the ventilation chimney at a distance of 34 meters from its lower mouth, with 51.60 meters of length; advancing the cuts, respectively, a small amount to the north, and another to the south, up to a new narrow passage of 21.20 meters of length, marked in the plan and projection of this deposit. (See Pl. III.)

The total extension of passage galleries and chimneys of both strata, according to what is just pointed out, is 370 meters of direction galleries, 176 meters of chimneys and narrow passages of all kinds, and 55 meters of unfruitful transversals, it not being possible to appraise exactly the works of real exploitation or superficiales, as some cuts are refilled or inaccessible. However, the figure, declared by the proprietor to be 1,600 tons of coal sold up to the present, appears to the undersigned engineer rather exaggerated, because, adding to it at least 25 per cent for waste and worthless coal, it amounts to a total of 2,000 tons taken out; and as the average thickness of both layers is only 0.90 meter, this would necessitate an exploited extension of 2,222 square meters, which does not exist in fact.

In short, the general total of lineal excavation is 600 meters, opened in five years' work, amounting, therefore, to 120 meters per year and 10 meters per month,

without counting the slight works of partial surveyance in two shafts, a gallery and some drains, which, nevertheless, would add only an insignificant fraction, and of no value to these figures, which, for that matter, show, as I said at the beginning, a great slowness in working these mines.

In any way the total advance during the past sixteen months, between my two former surveyances, consists of 103.58 meters of direction galleries and 55 meters of chimneys and narrow passages, or a general total of 158.58 meters of lineal works, making a monthly average of 9.91 meters, which approaches sufficiently but does not reach to the already short general average of the works executed in the five previous and first years of existence of the mines, and, therefore, if I deplored more than a year ago the slowness of all the works, I must repeat now as much more, adding, because I ought to state it, that both these last figures and the general condition of the excavations reveal very clearly the culpable neglect in which they have been left, the incalculable slowness with which they have been prosecuted under normal conditions that were so favorable but will never return again, and so reveal the slight guarantee which the organization and the present progress of the works offer, to such an extent that the laborers that were employed on the whole work did not exceed between eight to ten men, even during the time of my last visit, at which time, in the interest of self-preservation, they should have been taking such interest in the speedy repair of the excavations that were falling in.

The strata, both in the gallery *Esperanza* and in its auxiliary, present a thickness never less than 0.50 meter nor greater than 1.40 meters and inclinations no less variable, seeing that at point A there is one of 70° , at the covered chimney one of 55° , at the point C one of 57° , at the point D one of 50° , and at the faces which are seen represented in fig. No. 1, Pl. III.

Between the two chimneys of both galleries the strata shows a small break, which in fig. No. 2 is shown with full detail, this being the only accident of this nature which has been presented up to the present in all the extension of the scanty works which have just been detailed. However, it might be possible to attribute this, perhaps, to a cause similar to the obstruction which the present layer shows in the back part of the transversal gallery E.

This obstruction, in spite of the 23 meters of gallery which has lately been executed, has not yet disappeared, nor is there shown proximate indications that permit us to suppose the readjustment of the layer in this place.

In the gallery *Caridad* and contiguous works this central strata also shows a similar thickness, though in general a little larger, and inclinations comprehended between 28° and 45° , but almost ever rising above the smaller at 40° .

Unfortunately, at 7 meters farther from the new excavation, made after my first visit, this layer has likewise shown a fault of clay, very solid and not brittle in formation, of 2 meters of thickness, almost vertical, and with direction marked with a red line in the accompanying plan and projection (see Pl. III). As the bed and roof of the layer at this point are of slaty clay, with the same color and with identical conditions of composition and location, its investigation on the other side of this accident is rather doubtful, and there is no other remedy than to direct three registries to the north, east, and west, respectively, in order to illuminate this most important point of the ulterior course of the works.

All that has been stated up to here, and the persistence with which numerous outcroppings are presented along the arroyo of *Sugui*, and which constantly proves the course of the coal beds, gives rise to agreeable hopes for the future of the region not yet exploited; though there will always have to be counted on the narrowing, obstructions, and other accidents that will diminish somewhat the presumable amount of combustible. However, adhering to what the geological facts gathered up to the present show, the undersigned engineer thinks that these combustible strata, tertiary or secondary, ought to have neither the extension nor the regularity of those

of other older and essentially carboniferous grounds, and that it might for that matter happen that the layers are interrupted, substituting other beds of different nature in order, perhaps, to reappear a little farther on.

Almost all these predictions, as has been seen by the recent facts which I have stated, have been partly confirmed during the process of time, comparatively limited, between my two visits to these mines; and therefore it does not seem to me useless, always on the ground of the geological facts which I have gathered, to persist once more in the very peculiar character of these lignite deposits, in relation with the bituminous always more important. Those ought not to merit the confidence which could be grounded on these by their regularity and great extension, that permit the employment and unqualified investment of great capital with the least possible risk within the very special conditions of the mining industry.

In regard to that which relates to the apparent quality and industrial properties of these lignites, here is the résumé of the observations and experiments that I have had occasion to make.

Considered mineralogically, the lignites of both beds look alike, but differ in some of their properties; the one proceeding from the western strata (gallery Esperanza) has 1.329 of density; it is a brilliant black, regularly hard, with some gypseous small veins among the mass; of compact texture, rolled structure, and rays and powder slightly dark gray; that of the central strata (gallery Caridad) has 1.340 of density; is equally black and brilliant, but not so hard, and, above all, has concentric circular structure, very noticeable, or, what is the same, there is noticed in it a great multitude of circles in groups, with centers exactly like those that are discovered as lines of growth on the vegetable shoots and trunks. In this is seen frequently, in addition, some pyrites in spots.

In order to appraise justly the industrial properties of these combustibles it would not be enough to study them absolutely, because the result which has been found in certain conditions, inherent to each assay, would teach us nothing regarding those same properties studied in other combustibles, with analogous but not the same circumstances. Therefore I have at the same time executed, and in reactive conditions and temperatures exactly the same, not only the laboratory assays of these lignites, but also those of the English and Australian coals which were in the market for sale at the time of these experiments (month of August, 1878). The English coal—Cardiff—to all appearances, coming from Ynchauste & Co.'s warehouse, and that from Australia, furnished by Mr. Aldecoa, merchant of this city, coming from Wollorong mines (Newcastle), and from the Agricultural Mining Company's mines (Sydney). The average of two assays upon each combustible gave the result stated in the annexed statement (see Table III). The careful examination of these results shows that though the combustible we are speaking about is inferior to those from foreign derivation used in these islands, they have precisely the quality of the coals which ought to be applied for combustion in the furnaces of steam engines.

Supposing that in these the water that feeds the boiler is at 40° and that in the combustion of the coal there is wasted a third of the developed heat, there will be had as an effect of practical utility, or what is the same, the amount of steam at 100° which the combustion of 1 kilogram of coal produces.

$$\frac{\frac{2}{3}}{550^{\circ} + 100^{\circ} - 40^{\circ}} \frac{5829^{\circ}}{= 6.37^k \text{ for the coal coming from Esperanza gallery.}}$$

$$\frac{\frac{2}{3}}{550^{\circ} + 100^{\circ} - 40^{\circ}} \frac{5643^{\circ}}{= 6.16^k \text{ for the coal coming from Caridad gallery.}}$$

$$\frac{\frac{2}{3}}{550^{\circ} + 100^{\circ} - 40^{\circ}} \frac{7530^{\circ}}{= 8.23^k \text{ for the coal coming from England.}}$$

$$\frac{\frac{2}{3}}{550^{\circ} + 100^{\circ} - 40^{\circ}} \frac{6205^{\circ}}{= 6.78^k \text{ for the coal coming from Australia.}}$$

As a very useful figure for knowledge, let us estimate also, in analogous conditions and in relation to the ordinary prices that the foreign coals reach, that which, as a maximum, those from Compostela ought to have, deducing therefrom the useful heat of those, that is, that which on a final trial becomes useful to commerce and industry. In this way it will be possible to appraise in concise terms the competition that the native coals can make on the markets of these islands as against the foreign productions. The current price of foreign coal in the Manila market, the regulator of the rest of the markets of the archipelago, used to be from \$10 to \$12 for the English coal and from \$8 to \$9 for the Australian, or an average of \$11 for the first and \$9 for the second. Supposing always that in the apparatus in which this coal is applied there is a loss of a third of the heat produced by the combustion, the useful heat, or what is the same, a million units of heat will be:

$$\frac{1,000,000^\circ \times \$11}{1000k \times \frac{2}{3} 7,530^\circ} = \$2.19 \text{ for the English coal.}$$

$$\frac{1,000,000 \times \$9}{1000k \times \frac{2}{3} 6,305^\circ} = \$2.17 \text{ for the Australian coal.}$$

Taking from both results the cheapest one, and assigning to those of Compostela, those acquire, it is inferred, a commercial value of—

$$2.17 \frac{1,000,000^\circ \times \$X}{1000k \times \frac{2}{3} \frac{(5643 \ 5829)^\circ}{2}}; \text{ or, } X = \$8.30 \text{ per ton.}$$

This being the equivalent to that of the foreign coals, any other smaller price that the native coal from Compostela might have will make it therefore of much more advantageous and economical use for commerce.

It is true that the present value (November, 1878) of the foreign coals is much smaller than those which I have taken as a point of commencement, for the English coal is sold at \$8 and Australian at \$6.50 per ton, or at \$1.59 and \$1.57, respectively, per million units of heat, but even with these abnormal prices the deduced value for that of Compostela would be \$6 per ton, which is precisely the price at which it was sold at Cebu during my stay in that island.

There results from this that, out of this abnormal circumstance of the moment, an average price from \$6 to \$7 per ton is very profitable for commerce and for navigation, and it is difficult for the foreign coals to compete with it, due to the other advantages that the merchant marine and that of the State have found in the coals in question.

This price rewards with easiness the anxiety of the industrial miner, only considered as such miner, and supposing that the mines are worked with a scientific plan, well ordered and economic.

But, by taking out and preparing conveniently their coals, it is found they had to be transported first across some 14 kilometers of a very rough road, impassable in the rainy season, and afterwards by the maritime route up to the warehouse where they are needed by the buyer. In these travels the miner loses the greatest part of his profits, because, besides the high freight of trade, the present land transportation in itself swallows almost 25 per cent of the average value which has just been fixed.

There seems to be deduced from this, as a fatal and unavoidable consequence, that the miner must be at the same time a builder of good roads and an agent of trade vessels to carry his goods to all the markets, combining his industrial business with others purely commercial. But besides the fact that the economical convenience of division of the work repulses the miner, the painful experience acquired in that same island of Cebu, with the ruin of other similar mining enterprises, renders it a very profitable lesson. There has been seen, in fact, the discouragement produced in the mines of Uling and Alpaco by the investment of large capital in roads and other

outside works, uncommon to mining, before commencing the true work of these mines, discouragement which had for an inevitable consequence the total abandonment of the mines, which were still, we may say, almost in a virgin condition. Is the development of the coal industry of this island of Cebu possible under these circumstances?

These considerations are not stated by the undersigned engineer as an aid to the claim which the interested party states in this expediente; for, besides the estimation of this point not being perhaps for his contention, he understands, on the other hand, that the imposition of duties on foreign coals, besides injuring the commerce of steam navigation, would involve in itself the germ of decay for the same coal industry which would make an abuse of its advantageous position, weakening itself, as always happens in the course of time in all privileged industry. But at the same time he believes it his duty to state the true condition of this question in order that it may be known by the Supreme Government, which, without any doubt, will know how to plan those prudent measures which, without creating privileges or troubles to other industries, shall favor this so very unfortunate mining industry of this archipelago.

This I said in the month of November of the former year, and this same thing I can repeat at present, since in general terms the State ought to facilitate the ordinary transportation of all the industrial products, and very especially that of coal, for the special circumstances which are contained in this report, above all in these far regions, though in harmony always with the progress of the country, with the general interests of the remaining industries, and with the possibility that is furnished to the miner of carrying his products to the market, a thing almost impossible without an ordinary road, whose construction can not be demanded from him, due to reasons just pointed out. The concessionary of Compostela has succeeded to this sacrifice, if such it can be called, for the State—the establishment of ordinary means of transportation in a civilized territory; then let there be built for him the high road from his mines to the shore, if is wanted, with an outline and execution which he has not got, due to the lack of learned direction (see the sketch, Pl. VI), by which he can easily transport his coals to the shore more economically than at present, furnishing within a certain time, never so soon as many believe, and always under the supposition of a radical reformation in its organization, the 8,000 tons which the navy requires. The State can not, however, carry her complacency further without exposing herself to the charge of being unjust and discriminating by not being disposed to make as many tramways as there are deposits existing in these islands, or upon this island; all of them deposits with similar circumstances of lying and location which, if at present are not worked, can be exploited to-morrow.

And under this point of view it is necessary to confess that the advantages which the Compostela mines can contribute in relation with the similar deposits, not exploited, are very few. The experience of a year and a half has proved to-day that her works are the only titles which she can adduce, as has just been proved; all the rest insufficient for its extension and painful for its present condition.

Regarding the guarantees which the exploitations in question offer, the undersigned chief engineer understands that they can be of several kinds. Now, regarding the rank and special character of the deposit; now, with the executed works and amount of capital invested in them; now, with the tangible resources of material which can be at present seen; with the materials and instructed working population; now, lastly, with the moral and material resources which in the future they may intend to employ in the development of schemes which perhaps exist.

Regarding the first extreme points—of the rank and character of the deposit and importance of the works—I have sufficiently spoken in order to be abundantly understood; and concerning the capital invested, and the present visible resources of the mines, they are reduced to some 5,000 or 6,000 pesos invested in the works,

including in them the shores, wood roads, allowances, and warehouses on hand within the claims, and an insufficient material for two sieve grates, some eight small wagons, some hoarded wood rails, and hardly the necessary number of tools for some 25 or 30 miners, which on the other hand can not be distributed on account of the suppression of daily wages which took effect some fourteen months ago, according to the voluntary statement made to me by some laborers in the same mine.

Regarding the projects which the concessionary ought to entertain in order to continue or to develop his industry, they ought to be and would be undoubtedly very extensive and suitable, but the undersigned engineer can not know them, and even if he knew them he could not ground upon them his report, which can only be based upon accomplished facts, such as are all those that have been pointed out, or upon considerations deduced from scientific principles within his knowledge. Bringing this to a close, then, with a résumé of all that has been said, and stating its natural and logical consequences with the necessary distinctness and plainness, the undersigned engineer, treating of the considerable interests of the State, though it is painful to him in some points, must state:

First. That the coal deposits of Compostela belong to the rank of lignite deposits, more or less recent.

Second. That within this rank and due to its conditions of deposit they present sufficient good appearance, and a pleasing future can be expected, always with the consequent exception to its limited importance, without even supposing them to be of an indefinite duration.

Third. That the executed works must be qualified as insignificant and therefore as insufficient to provide for the needs of the navy at present.

Fourth. That in order to produce with regularity the 8,000 tons that are estimated, a term is necessary which depends upon the resources that it has at its disposal.

Fifth. That the present condition of the works is rather painful and shows a neglect much more inexplicable, as it was done while the State was granting to the mines a marked protection, and much more worthy of censure, since its proprietor was making, in the meantime, propositions which logically supposed the existence of circumstances entirely contrary to the reality.

Sixth. That the combustible is of excellent quality, and of an employment as much more economic in regard to foreign coals used in the archipelago as that its price is removed further from the extreme limit of \$8 per ton in normal conditions or \$6 per ton in exceptional conditions, estimated for the former year; and

Seventh. That the guarantees which, consequently, the mines present are insignificant, for its past almost null, deplorable; perhaps negative for the present, and entirely hypothetical for the future.

However, your excellency will report that which you believe most suitable.

Cebu, July 24, 1879.

ENRIQUE ABELLA Y CASARIEGO,
Chief Engineer.

COMMENTS OF INSPECTOR OF MINES ON ABOVE REPORT.

MOST ILLUSTRIOUS SIR: I have the honor to return to your excellency the expediente forwarded by Mr. Isaac Con-ui upon the construction, on account of the state, of a tramway from the coal mines of Compostela, in Cebu, up to the cove of Cot Cot.

The second-class chief engineer, Mr. Enrique Abella y Casariego, who has been for some time now pursuing geological studies in that island, is well acquainted, without doubt, with the measures which the general inspectorate of public works wishes to obtain in order to render its final judgment, which fact impelled this inspectorate in my charge to send a copy of the expediente to the aforesaid engineer, in order that his report might embrace such details as relate to the matter under consideration.

Mr. Abella's report is, as he himself states, an amplification of the one issued on

the 27th of November, 1878, in connection with another expediente concerning the imposition of import duties on foreign coals, commenced by the same Con-*ui* nearly two years ago. The amplification consists in showing the progress realized up to date in those mines since his last report, progress which, unfortunately, is almost null and to a certain extent negative, if there be borne in mind the fact that the condition of neglect in which those mines are found not only means the actual paralyzation of the works, but also that which is more serious—greater difficulties for the later exploitation that will have to be contended with when the works are operated at a lower level than that which they have at present, since they should necessarily be open in order that the mines may attain an active production—difficulties resulting in the most serious consequences from the caving in of the works, which, because of this most deplorable neglect, has already commenced, and which, being extended, will produce afterwards pressures very difficult to withstand.

This inspectorate has thoroughly studied the attached report, and thinks nothing need be added to it, knowing, as it does, the competency of the engineer who signs it and his special knowledge of that island, whose geology he has been studying for the last two years.

The report is accompanied by sketches and careful details of the Compostela mines and of the area which separates them from the Cot Cot cove.

The copies of these documents, as well as the performance of other preferred matters relative to the commissions which your excellency was pleased to confer upon me concerning the district of Surigao, have been the cause of the delay which your excellency will observe in this matter.

May God protect your excellency many years.

Manila, November 29, 1879.

JOSE CENTENO.

To the Illustrious DIRECTOR-GENERAL OF CIVIL ADMINISTRATION.

It is needless to add that the tramway was not built either by Con-*ui* or the state. It is also needless to add that these documents prove that up to the year 1880 no real and substantial efforts were made to develop the coal deposits of Cebu. A blind reliance upon government aid and a haphazard development without sufficient prospecting of the coal area resulted, as it will continue to result if like policies are pursued, in additional failures. Failure under properly directed efforts and with ample capital and skilled labor is not probable.

CHAPTER XIV.—THE ISLAND OF MINDANAO.

From all the evidence obtainable the late inspector of mines of this archipelago, in an article written by him in the year 1899, was fully justified in his statement: "The beautiful island of Mindanao is the richest in minerals in the whole archipelago. There are to be found mineral deposits of all kinds, the chief of which are gold, silver, and coal." The island seems to be extremely rich in its deposits of coal, so far as number and extent are concerned, although less is known of its value and quality than of the other regions that have been described in this work.

In the year 1847 the governor of Caraga (now Surigao), by command of the governor-general, submitted an extended report in reference to the coal deposits of the island of Siargao, off the northeast

coast of the main island of Mindanao, which report is of interest, as it is descriptive of the deposits of Cacub and Dapa, which have been made the subject of an attempted entry of 60 pertenencias by Isidoro Sanger, under date of November 14, 1898, and by means of one of the so-called "third-class claims," whose illegal and fraudulent character have been exposed in official reports of the mining bureau.

The report of the governor of Caraga was made to the commanding general of the Visayas on March 25, 1847, the substance of the report being—

First. That there are two mines discovered, situate in the towns of Cacub and Dapa, both on the island of Siargao.

Second. That the mines, not being exploited, there is no present supply of coal to be obtained from them.

Third. That no estimate can be given as to what amount these mines would produce, but the deposits afford indications of abundance.

Fourth. That the claimants of the mine, not having their mines exploited, decline to submit propositions to furnish coal therefrom to the state.

Fifth. That the cost price of placing the coal on the nearest coast would be 11 reales per quintal; that the transportation is expensive, having to be made over difficult roads, using carabaos as beasts of burden; that anchorage grounds are not frequent except for small boats, which generally go to the shore, and the ships of heavy burden must anchor some distance from the shore and in a situation that would not secure their safety during the southwest monsoon.

It is but fair to say that this information is not quoted as reliable, since the governor of Caraga himself says that his sources of information are not entirely satisfactory. Several boxes of this coal were obtained and sent to the governor general.

In his letter of transmittal the commanding general (acting governor) of the Visayas makes this interesting comment, which we quote because of its bearing upon questions of transportation and labor, both of which are of great importance in the development of the coal mines of the archipelago:

The mine situated at Dapa is found nearer to the coast than that of Cacub and affords better samples. Both distances are short, although I am not able at the present time to state it by reason of the lack of data. Those from the territory capable of judging say that a well-planned road for these mines would be insignificant. In order to complete this account so far as in my power, I call your excellency's attention to the fact that among the various obstacles that exist for the prosperity of the province under my command that account must be taken of the lack of laborers, the lack of affection for labor in our natives, and their inconstancy in carrying to completion the agreements they make and the enterprises they undertake, with which difficulties whoever resolves upon the exploitation of said mines would perhaps vainly have to contend. This objection, however, is not insuperable, because the island of Bohol affords a considerable and poor population who daily emigrate in search of work, and from there the hands which are lacking for the labors of the mines and

the construction of the main passages which lead to them could be taken if they could be utilized for these services.

The boxes of coal were sent to the inspector of mines, Mr. Baranda, who evidently did not have a very good opinion of the samples, for in his very brief report of July 16, 1847, he disposes of the entire matter in this laconic statement:

In view of the communication of the governor-intendant of the Visayas, and the samples of coal which your excellency was pleased to send me, I may say to your excellency that in this inspectorate there is an account of the deposits of the island of Siargao, and that I visited them myself in November, 1839. The quality of the coal can only be known with certainty by making tests, and repeated tests, for the purposes for which it is to be used. The chemical tests and the appearance of the outside characteristics might perhaps be a guide of little security, so that I shall limit myself by stating to your excellency that I have seen samples of coal from the said island of Siargao that seemed to me of better quality than those which your excellency was pleased to send me.

Near to the island of Siargao is the island of Dinagat, and in the year 1874 five petitions appear upon the records relating to coal deposits upon the latter island, and located at Tubajong, Mabua, and Aliton. Evidently news traveled slow in those days, for, while the code of 1867 had been published in the Gazette early in the year 1868, after the lapse of six years the knowledge of the new code had not reached the capital of the third district of Mindanao, at Surigao, for all of these petitions were drawn, presented, and forwarded under the code of 1846. They were returned to the provincial governor for further proceedings under the new code, and further evidence of them is not found in the records of the inspectorate. Five years later (1879) one Rafael Herrera Lo-Liang-Co, described as a Christianized Chino, and a merchant and resident of the town of Tabonga, in that district, petitioned for one pertenencia of coal land near Tagagag, proceeding under the code of 1867, and succeeded in advancing his claim to the point where it was sent to the general inspectorate of mines for the purposes of legal demarcation, and a survey was ordered in April, 1880; but it would seem that the Chino did not value his coal mine to the extent of paying the cost of the survey, for on July 20, 1880, he renounced his claim and it was abandoned.

In the year 1886 a merchant of Cagayan, a peninsular Spaniard, named Ovidio Fernandez Pereiro, presented a petition for 35 pertenencias, under the name of "Ulloa." This mine was located at the village of Calvan, in the town of Amulung, near the estuary of the same name, in the district of Cagayan. This proceeding likewise seems to have come to naught, there being no record save only the fact of the presentation of the petition. From other sources we learn that this deposit is a very large one and capable of easy development.

This completes the record of the coal entries and record discoveries on the north side of Mindanao. It is known, however, that very

many other coal deposits are found in these neighborhoods, all of which are undeveloped and their value unknown. On the east coast coal has been discovered in many places, and notably at Bislig. It is also discovered at many points on the south coast, but no record is made in the archives of the bureau except that of the deposit of Mount Marasingan, in the territory of Sibuguey, upon which we have two long reports, dated in 1855 and 1856, respectively, from a commission under the direction of the commandant of engineers of Zamboanga, who led an expedition for the purpose of examining these coal deposits, which had been reported to be of great extent, easy of access, and available for the purpose of supplying the naval station of Zamboanga with coal for the fleet.

These reports will not be given at length. The result of the expedition was 36 tons of very dirty coal, to extract which amount and convey it to the coast required the labor of 100 prisoners for the period of seventeen days. The coal was not found in large deposits, and the distance from the coast was from five to six days' travel, according to the method of reckoning distance by the natives of that section. The coal was brought to Manila and tested in the war ship *Magallanes* in the presence of many competent witnesses. It was found that the amount consumed was from 23 to 26 quintals instead of from 9 to 10 quintals of Cardiff coal for a like period. The residue of ash was very great, and the coal was declared unfit for steam-making purposes. These reports contain much interesting data of local historical value, but as a proof of the extent and value of the coal deposits they have little value. It is but fair to say that the examination of the deposits was superficial, and the whole transaction leaves an impression on the reader that but little real interest was felt in the result of the expedition by those in charge. In fact, the eminent engineer, Antonio Hernandez, in his comments thereon, sums up the result in this manner: "Their discovery adds only some interesting data to that which exists concerning carboniferous deposits in many other points of the Archipelago."

In conclusion, we need only to add that since the American occupation we have had numerous reports of the existence of coal at other points, but these reports have little value by reason of the lack of samples of the coal, as well as the uncertainty of description.

CHAPTER XV.—THE ISLAND OF MASBATE.

On July 26, 1887, proceedings were commenced for the location of the coal mines "San Jose" and "Santa Cruz," of four pertenencias each. These two areas are contiguous and are located in the town of Cataingan, in the barrio of Nabangig, on the southeastern coast of the island of Masbate. On May 25, 1888, these mines were platted, having

been previously surveyed by the mining engineer of the inspectorate, and on May 31, 1888, titles of property were duly issued to Jose Muñoz. These properties have been worked with more or less regularity, and the titles have not been canceled or annulled by the Spanish officials, and upon the records they consequently present a prima facie evidence of title.

The records and archives disclose the fact that the concessionary was working the mines up to and including the year 1895, as will be seen by the extracts from these archives at the close of this chapter. From the report of an English engineer who visited these mines for the purpose of making a report thereon shortly before the Spanish-American war we have obtained the following detailed information in reference to the deposit:

The coal fields are located at a distance of a little over 7 miles from the barrio of Cataingan, which is the place of landing. The property embraced in the title is intersected by the river Nabangig, and in the outcroppings along the banks of this river three workable seams of coal are found—one of 4 feet 1 inch in thickness, another of 3 feet 2 inches, and the other of 3 feet 1 inch, and all lying at an angle of 70°. Several other beds of coal are also found, but too thin to work profitably. From the formation it is to be inferred that there are other workable seams in the neighborhood which will be found as the known seams are being worked.

An analysis of the coal from the 4 foot 1 inch vein, made by Mr. A. H. Holditch, an English analyst, gave the following result:

Water, at 212° F	10.50
Ash	4.38
Sulphur	4.00
Volatile matter.....	43.31
Fixed carbon	41.40
Total	100.00

To this analysis Mr. Holditch adds, as a notation:

The coal is remarkable as containing so much moisture, but I failed to make it coke at all. It did not seem, by any heat I could apply, possible to make the particles adhere. It crumbled up at once when removed from the crucible.

The ash and the sulphur are both very small, and the coal would make very good steam coal.

The quantity of moisture in the coal was caused by the sample having been taken from the outcropping, and by the hygroscopic quality of the coal generally. The coal was found to be hard and bright looking, and on the return trip of the engineer from Masbate the thick coal was tested on one of the Manila steamers. It was found that it was almost smokeless, while the Japanese coal that was much used gave off large volumes of black smoke whenever coal was put on the fires. The engineer on board the steamer informed him that the Mas-

bate coal did not make so much dust as the Japanese coal, and that 10 tons of Masbate coal was equal to 12 tons of the Japanese coal that was sold in Manila for steam purposes.

The same engineer is also the authority for the statement that he had called at Singapore on his way home, and made inquiries about the Japanese coal and examined some of it, and found it very small and also that after being exposed to the weather for a few months it was very inferior to Cardiff coal and was only in fair demand on account of its comparative cheapness.

The amount of coal in the above concessions is estimated to be sufficiently great to keep a colliery going for twenty years, with an annual output of 3,000 tons, and that two years' time would be required to open out the mine for a full supply. That when the present concessions are exhausted, they could be easily extended to any extent, at merely a nominal cost, and the coal mines of Masbate were recommended by him as a safe and remunerative investment.

The coal mines in question have been visited by American prospectors and miners since the American occupation, through whose courtesy we have received samples of the surface coal from these mines, and also from other outcropping in the neighborhood. The examination of these samples confirms the recommendations made in the report of the English engineer above quoted, and the location of the coal deposit geographically seems to confirm the theory that this deposit is a portion of an extended seam of coal running from the northwest toward the southeast, and appearing under similar conditions on the islands of Mindoro and Samar. We are not in possession of any information whatever in reference to the present owners and claimants of the Spanish titles, and by reason of the fact that all work in the way of mining in the island of Masbate has been necessarily suspended by reason of insurrection, are unable to state whether the property has been abandoned by its former owners or not. There seems to be very little if any question, however, as to the practical steam making qualities of the coal of Masbate, as will be seen from the comparison of the analysis contained in this chapter with the analysis of the coals of Japan and other lignite coals, which will be found in a subsequent chapter of this work. The island of Masbate, by reason of its nearness to the city of Manila and the proximity of the mine to the coast, together with other physical surroundings that have been called to our attention by the American prospectors who have visited these deposits, especially commend it as a favorable field for development, and it is probable that the coal mines of Masbate will be worked at an early date.

From the archives of the inspectorate we gather the following interesting incidents relative to the exploitation of the Masbate coal fields of "San Jose" and "Santa Cruz." Notwithstanding the fact that the law

presumed an annual visit and inspection of the mines by the engineer of mines, no visit had actually been made to the mines of Jose Muñoz & Son, at Cataingan, up to the year 1894. In March of that year Enrique de Almonte was commissioned to make a visit of inspection, and his report was by no means favorable to the concessionary. The force of men was found insufficient, the working of the mines avaricious and detrimental to their future profitable exploitation. No shafts or tunnels had been constructed, and the coal had been mined from the surface croppings in no less than sixteen different and distinct places, producing a total output of 623 tons in six years, and all of these from open pits along the bank of the river Nabangig. It brings a smile to the face of those of us who are accustomed to the regular and systematic workings of the lignite coals of the Pacific coast, and the mountain States and Territories of the United States, whose coals are in all respects similar to the Philippine coals, to examine the diagrams and read the descriptions of the mine workings of this Masbate coal mine. It was not mining at all. Jose Muñoz, the concessionary, was fined 100 escudos (50 pesos), and paid the fine. The next year, however, Muñoz was on time with a petition in February, in which he set forth his troubles and sorrows with his coal mine, and as this petition graphically calls attention to two very important questions in connection with mining in the Philippines, namely, the labor question and the holiday question, I give his petition in full:

To the Most Excellent DIRECTOR-GENERAL OF CIVIL ADMINISTRATION:

Jose Muñoz, with personal cedula, etc., concessionary of the coal mines "San Jose" and "Santa Cruz," situate in the district of Cataingan, in Masbate, respectfully shows: That in spite of the efforts that he has made to attract to his mines the scanty and scattered population that the extensive township of Cataingan contains, and even that of the neighboring town of Palanas, it has been impossible to secure them, even conceding to them every advantage by the construction of dwelling places for them and the payment of day wages very much higher than usual in the district. Those natives, accustomed to a pastoral life, alternated with small cultivations which permit them to live at ease the greater part of the day, in no manner admit the regular labor which mines indispensably require, and the few operatives who, by force of gifts, have consented to give their services as mining laborers, have deserted in a short time, wearied by those labors that they find very difficult and that require a sustained muscular force.

Another inconvenience is that when any native does consent to enter into a contract, it is with the condition of not abandoning his little cultivated field, and at the arrival of the period of seed time, or harvest, they abandon the mines without a thought of the injuries that result from their instability.

Obtaining workmen from the island of Leyte and from the provinces of the Camarines and Albay has been tried, and some of them, by reason of having in their possession a small amount of money, took themselves off, especially at the time of the occurrence of the fiesta of their pueblo; and others because they found the work of excavating the hard sandstone that constitutes that land very difficult, and all of them, in general, find the scantily inhabited community very unpleasant, because unprovided with the fiestas that they find in their own pueblos. Thus it is that at times not even the doubling of the usual pay in that district has been found effective

in retaining them. Last year a few and limited supply of laborers were hired and less than half were from this district; the rest were made up of some Tagalogs, some Vicols, and the remainder Visayans from various places, and, as customarily happens in such cases, of the poorer class from each province, so that each ton of coal has cost nearly double the price obtained for it on sale.

Under such conditions it has only been possible to exploit in open workings, with a notable injury to the said concessionary, since the laborers obstinately refuse to work under ground, and the undersigned is not able to collect a colony of Ilocanos, or from another tribe of the country in sufficient number, who by contract will adjust themselves to a fixed time, which is that which he attempts to secure at present; he will have no other remedy than to have recourse to Asiatic immigration, difficult of promoting and establishing to advantage, for which he will have to secure considerable capital and no little time, in case the petitioner attempts by all the skillful means at his command to find in the country itself the hands that he needs.

If to all this I have stated your excellency adds the enormous inequality in exchange with Europe, which makes the exportation of the machinery necessary in every kind of a mine impossible, and which has paralyzed for the present the trade in which the subscriber was engaged with an enterprise in London, your excellency will be able easily to deduce the uncertainty of the present situation of the aforesaid mines, and in case that the visit of inspection to the said mines is made, the undersigned begs that you will be kindly disposed to pardon the faults that may be observed in the course of said visits of inspection at said mines, because of their being due to causes foreign to the will of the concessionary, etc.

Manila, February 15, 1895.

JOSE MUÑOZ.

Upon the recommendation of Inspector Abella, who said: "These difficulties, more or less exaggerated, are unfortunately too true and both contribute to delay effectively the development that was hoped in these and other exploitations of Filipino coal," the visits of inspection for 1895 were indefinitely postponed, as had been done also in the case of the coal mines of Mindoro and other localities.

It may not be out of place to ask these questions: Under the changed condition of affairs, will the natives of these islands now give their services as laborers in the mines for a fair compensation, and with a constancy that will enable the mines to be operated with regularity, and to compete with the Australian and Japanese coals in the Philippine market? Or, on the other hand: Must resort be had to Asiatic labor by the importation of Chinese, with the alternative of abandoning the rich mineral deposits of coal that are known to exist in the archipelago? The answer to these questions is with the natives themselves.

CHAPTER XVI.—THE ISLAND OF LUZON.

In addition to the deposits of coal on the island of Luzon and its neighboring small islands, which have been heretofore described in more or less detail, it is well known that there are other deposits of lignite of like character in greater or less quantities in very many other portions of the island.

On May 26, 1889, one Anacleto del Rosario and an associate solicited the registry of a coal mine to be known as "Legaspi," at the place called Binacnuyan, in the town of Montalban, in the province of Manila.

Upon publication of the notices, Mr. Esteban Atencio y Bonilla presented a protest, alleging that he was the owner of the land, and on August 25 he presented a certificate from the inspector-general of mountains in order to establish his title to the property. The petition for demarcation accompanied by samples of the coal was presented, notwithstanding, but before official action was completed, and on October 7, 1889, the mine was formally renounced by the claimants. The samples of coal from this deposit seem to be of superior quality and very similar to the samples of coal from the island of Polillo, in the province of Infanta, one of the deposits of which furnished the basis for the location of the "San Rafael" mine on July 29, 1877, based upon a discovery on the eastern slope of Mount Malolod.

From Centeno's *Monografias Geologicas* it is learned that in the destructive earthquake of 1879 pieces of mineral coal were cast up from the fissures that were opened in the immediate vicinity of the town of Ayuso, in the province of Tarlac. We have recently been shown samples of coal that were said to have been obtained at various points in the Zambales Mountains, and it is a well-known and established fact that there are large deposits of coal found at various points in the rich Cagayan Valley at the northern end of the island. Coal has also been discovered since the American occupation on the west coast of the island of Luzon, in the foothills of the mountain chain between the Ilocanian provinces and Lepanto and Abra. "In fact, deposits of coal are distributed from the northern end of Luzon to the southeastern extremity. Of many of these occurrences nothing more is known than that lignite has been found. The vegetation is so luxuriant that in most cases it is something of a task to ascertain anything more definite. The best deposits known appear to be in the extreme southern end of Luzon and on small adjacent islands. Here the quality is good and the thickness of the beds reaches nearly 15 feet. The outcrop is near the shore, and it was here that the insurgents supplied their steamers with fuel."

The above quotation, from the pen of George F. Becker, United States Geologist, is a fair and exact statement of the conditions in reference to the coal deposits of the archipelago generally, not only as applied to Luzon, but all other portions of the islands.

At various distances from the Laguna de Bay, in the provinces of Laguna and Morong, are also many known beds of lignite, and some of them of sufficient size and convenience of location to render them profitable for development as soon as the necessary roads and bridges can be supplied for the purposes of transportation. In this locality also, and at various points between the eastern end of the Laguna de

Bay and the Pacific coast, natural oil springs are reported, which seem to indicate the presence of an oil-bearing strata of considerable extent. So numerous are the indications of coal and oil in the immediate vicinity of the city of Manila that it is a matter of considerable surprise that only one attempted coal location has been found upon the records and archives of the department of mines. I have made a special effort to find out the particulars in reference to the coal deposits last quoted, and from the information that I have been able to gain I have very little doubt of the existence of coal in that portion of the island of Luzon, good in quality and extensive in quantity. It would seem that but very little attention has been given to the prospecting and developing of the coal seams and measures at the very doors of the metropolis of the archipelago. This is all the more remarkable inasmuch as so much aid and assistance have been given to the development of coal mining in the Philippines on the part of the general Government of Spain and the local government of the archipelago. While I am unwilling to assert as a positive fact that paying coal beds can be developed within the immediate radius of the city of Manila, since I have had no opportunity to verify in person the various statements that have been made to me in reference thereto or collect myself or under the supervision of the Bureau samples from these deposits, I am entirely satisfied in recommending to miners and prospectors a careful examination of the fields referred to, and on the part of the Government an examination of this entire section of country by an expert geologist and engineer from the Department of Mines as soon as the condition of the country will permit. In fact, a detailed geological survey of Luzon and its adjacent islands should be the very first field to receive attention when the geological work of the Mining Bureau is resumed.

CHAPTER XVII.—THE ISLAND OF MINDORO.

By reference to the table of mines it will be seen that ten mines of coal are credited to this little-known island. Of these the "Santa Maria," of two pertenencias, is located on the small island of Semerara, directly south of Mindoro, and title was issued for this mine on May 12, 1893. This mine is the property of the well-known merchant and boat owner, Antonio de Yribar, of Manila, who has made a business of trading with the island of Mindoro for many years. He is also the claimant of a mine situated on the main island of Mindoro, in the town limits of Bulalacao. This latter property does not appear in the list of mines, for the reason that it belongs to a class of claims known as "provincial claims," or claims instituted by petition presented to the politico-military governor and that had not reached the inspectorate of mines on petition for demarcation prior to American

occupation. We have had placed at our disposal by Captain de Yribar an elaborate report on this property made by the well-known engineer, Fenton W. Hill, of Manila, from which we shall make liberal quotations hereafter. The same report also contains information of a mine claimed by the Recoletos Order of Friars, in the same neighborhood. We acknowledge the courtesy of Captain de Yribar, not only for the use of this report and its accompanying maps and diagram of a proposed railway, but also for much other valuable information about the island of Mindoro and its resources.

The other nine mines are divided into two groups, eight of them located at Siay and Napisian, in the town of Bulalacao, and titled on May 12, 1893. Each of these mines embrace four *pertenencias*. The remaining mine, the "San Felix," of four *pertenencias*, also in Bulalacao, belongs to the "second class," or claims awaiting demarcation at the date of American occupation.

The careful reader will recall the accounts of the early visits made to the coal fields of Semerara, and especially the voyage that was arranged for that island, to be later extended to the island of Negros, and which resulted in the discovery and location of the coal mines at Guila-Guila, in Cebu. The coal of Semerara is, therefore, not a new discovery. The coal fields of Bulalacao are of later date.

The commander of the steam transport *Patino*, returning to Manila from a voyage to the south, put into the port of Bulalacao, on the south of Mindoro, on March 22, 1879, and the conditions of the sea and wind not permitting the continuance of the voyage he sent his first engineer with eight stokers and a guide to visit some coal deposits that the natives reported to him existed along the banks of a river near the anchorage. Upon the return of the *Patino* to Cavite on Christmas Day this adventure was reported to the commanding general of the navy, who immediately transmitted it to the governor-general with the remark: "The great facility with which it can be extracted, and the great resources for any ship belonging to the State which finds itself in need of combustible along these coasts, cause me to beg your excellency to read the report of the engineer concerning it." Upon this an expedition was organized and, under the direction of the inspector of mines, this deposit was further examined. From the voluminous reports and correspondence we extract so much as is of interest or value.

The first document is the report of the engineer, A. Valentin, dated December 22, 1879:

In compliance with your orders of the 21st of the present month, I left the ship at 5 o'clock on the morning of the 22d in order to go and investigate a vein or lode of coal situated at some 8 miles from the anchorage at Bulalacao. By means of the boat I was able to travel some 4 miles through a river which may be some 2 to 2½ meters in depth and 5 or 6 in width. At the end of these 4 miles the river separates into

two branches, which probably reunite, but as to which I am unaware, having not knowledge of the topography of said neighborhood. At the place where the river divides I went ashore with eight men from the ship's crew, and traveled some 4 miles on foot, crossing large plains (flats), which in that country are called "Cogonales," by means of a road, which should more properly be called a footpath, but on favorable ground, upon which good highways could be opened with great ease. At some 400 meters from the deposit of coal we had to cross a river, which should more properly be called a rivulet by reason of having no more than 2 feet of water by 10 in width, and we arrived at the place where the coal appears, which is none other than the very edge of the river which we had crossed. The said river, at the place where the coal is, forms an angle of some 140° , in which the currents caused by the floods continue year by year, carrying away ground, and for this reason the lands washed away have left open to view the end of the vein of coal. The bank of the river at the place where the coal appears is approximately some 4 meters above the level of the water. The depth of the river will barely reach from 2 to 3 feet. At 3 meters below the level of the ground the coal appears, and it enters the ground with an inclination of some 30° . Some 6 d/m of the vein are above the level and some 8 d/m are below the same (the water) and not in the bottom or bed of the river, but rather in the bank. The outline of the lode—that is, from the little which appears—is that of a corner of 4 meters in length, surrounded by veins of half petrified clays of different colors—dark gray, greenish, blue, and yellow—and in which are to be found some extremely hard rocks, very dense, with a vein of crystallized quartz. Above these veins of clay is another sandy clay, with many rocks of irregular form, but round, and the upper strata of the ground is of vegetable earth. The exploitation of this coal, in view of its situation, would offer few difficulties. The lode, I believe, should be an immense one; that which is exposed probably has a superficial surface of 4 square meters, and in order to find veins of greater thickness it will probably be necessary to open a gallery on the main body. I have extracted in half an hour some 200 kilograms, which we brought on board, and a trial of it was made with only 20 kilograms, it being noted that it gives off more heat than the coal which we used on board, and that it is almost completely consumed, leaving so little residue from the 20 kilograms tested that the quantity is hardly appreciable; it being found that 20 kilograms of that which is consumed on board has left more residue and has consumed the same length of time, of two hours in burning, as that of the same quantity of this class. It is a coal of medium quality, very similar in appearance to that from Australia and from Compostela, and in the small amount which I was able to bring pyrites of iron is not to be seen—qualities most valuable in coals which are to be taken on board as combustible for a steamship. I should like, sir, to give you a great deal more information concerning this combustible, but the small quantity which we have of it, and the lack of a generator especially constructed for this class of trials are lacking on board, and in order to thoroughly appreciate its qualities it would be necessary to have some 10 tons at our disposal and make a voyage with it in order to determine its exact value.

On January 7, 1880, Jose Centeno, having obtained from Cavite samples of the coal brought from Mindoro by the *Patino*, reported to the director-general of civil administration that there had been presented to him by the engineer of the transport a piece of coal coming, as he said, from a deposit of Bulalacao examined by him, and stating at the same time some facts as to the locality and circumstances of the situation of the deposit, which, although important, were not, however, sufficient to pass upon the true importance of the discovery,

it having nothing of especial value, because of the very short time employed in the examination. Señor Centeno says:

I then proceeded to make the assays in this laboratory, and from these it results that the coal in question presents the following characteristics:

It is black, unpolished ore of a slaty texture, of slight hardness, and brittle. Its specific gravity is 1.282. It burns with ease, producing a large flame with sufficient smoke, and leaves a yellowish-red ash in the quantity of 4.30 parts for each hundred.

Its composition in each part is:

Fixed carbon	41.06
Volatile matter.....	42.14
Water	12.50
Ashes	4.30
Total	100.00

Its caloric power, obtained by the litharge test, according to the method of Berthier, results in 5,198 calories. As these figures by themselves, without the corroboration of tests made on a grand scale in steamships, do not afford sufficient data to pass upon the true importance of this combustible, he has believed it proper to establish a comparison with analogous figures obtained in tests made under like conditions with the coal of Cebu (Compostela) already examined and tested in war vessels of this navy, and with conclusions as follows:

From this table it is deduced that the coal of Bulalacao, although somewhat less in combustible wealth and caloric power to that of the mines of Compostela, in Cebu, can, however, be applied in navigation and in general for heating purposes in steam engines. Its application will be more or less advantageous, according to the geological conditions in which the deposit is found, its distance from the sea, its proximity or distance from the forest that furnishes timbers for timbering, etc., all of which it is not possible to state without verifying upon the ground the detailed situations and conditions.

This resulted in the sending of an expedition headed by Don Jose Centeno, the inspector of mines, to the island of Mindoro, leaving Manila by the *Valiente* on February 16. From the inspector's report, on March 6, 1880, we quote:

We arrived at Bulalacao on the early morning of the 18th, and on the same duty disembarked the 20 military prisoners with their captain, and they were established at the site where the carboniferous deposit, the object of the examination, appears, which is discovered toward the north of the town, and at a distance of about 5 miles, the first two of which was covered by an estuary, navigable for boats of smaller draft, and the three remaining by plains covered with bamboo.

The deposit presents itself on the left bank of a river of medium size that flows from the mountains situated to the north of Bulalacao, inhabited by a savage race called Manguians. The cropping is found covered almost entirely by the waters, only a small part being visible, composed of coal, very dirty and brittle, that it would have been useless to gather. Therefore it became necessary, in order to be able to obtain some quantity of the combustible sufficient to make a test on a large scale, to change the bed of the river, which was accomplished by means of a dam made of stone rolled down, clay, and brush. With this work there was a strata (of coal) discovered, and, although with some trouble, by reason of the abundant filtrations which come in continually, 10 men, by means of a channel or drain, were able to take out about 3 tons from under the level of the river, it not being possible to continue this work because at the same time that the excavation was deepened the waters increased to such an extent that it was already impossible to control them.

The deposit discovered in this manner is a strata of coal with faces of clay. Its direction is W. 25° N. to E. 25° S.; its inclination 19° N., to 25° E., and its thickness 0.75 m. The roof of the strata is discovered covered by a bank of conglomerate composed of rounded stones and sand cemented by a quantity of clay, and upon this another strata of dark-colored clay, which forms the subsoil of the vegetable earth. All these strata form on the left bank of the river, a bank of 5 meters in height, that it was necessary to take down in order to be able to take out some coal from the bed of the river. Although this work presented some difficulties, among others the abundance of waters that had to be contended with in order to cut out coal at a level lower even than that from which it had been taken out on the creek bed, we undertook it, however, with a desire to increase somewhat the small quantity contained. Four days of continuous labor, not only of the 20 prisoners that we brought, but also of some workmen that we were able with great difficulty to obtain in the small town of Bulalacao, permitted us to make the clearing indicated and arrive at the strata of coal by means of a drain of 1.75 meters below the level of the river. In the meantime the drain traversed the clayey and waterproof roof, but at the first blow struck upon the coal the water rushed in with such force, seeking its level, that at every point it was useless to think of increasing by this recourse what we had been able to secure there. The workmen labored with great hardships, submerged to the middle of their bodies in water and exposed to a burning sun that would certainly have made them useless if this task had been continued some days. This consideration, added to the fact that the deposit is of very little interest, because of its small thickness, especially because of its location under the bed of a river that, even being disposed of by the means in our power, would have presented serious difficulties for its exploitation, and lastly because of the quality of the coal, which is very mediocre because it is presented in broken parts, slaty, very thin, and traversed to all appearances by cracks that make it exceedingly permeable, decided us in suspending these labors that offered no utility, either present or future.

We arranged, therefore, on the 25th that the prisoners should go on board, having collected and carried down already the 3 tons of coal that they had been able to take out, and that same night at 12 o'clock we weighed anchor from this port for the trip to Manila, where we arrived on the morning of the 27th.

It would seem from the reading of these two reports that the expedition under Inspector Centeno had made an additional and new discovery; that he did not, in fact, inspect the coal deposits described by the engineer of the *Patino* at all. This opinion is strengthened by subsequently acquired knowledge of the coal deposits of the town of Bulalacao, some of which are above and others below the water level.

We make the following quotations from the report of Mr. Fenton W. Hill, C. E., made in February, 1898, as the result of a careful examination made by him in January of that year of the claims of Mr. Yribar and the Recoletos Fathers, and heretofore referred to. His report includes a proposition for a railway to connect the Yribar mines with the coast at Bulalacao, and the construction of a wharf where ships of large tonnage can load direct from the coal cars. In the general remarks on the proposition he says:

The country surrounding these concessions is more or less mountainous, and is, as well as the range of mountains that flank the railway route on the west down to the coast, of carboniferous formation. This mountain area, the general direction of which is north and south, contains the numerous coal deposits that are to be found in this district. These coal deposits, so far as I could find out, run northeast and southwest, as nearly as possible.

In reference to the Yribar mine and the proposed railway and wharf he says:

I think it would be advisable to increase this area by the addition of five more blocks, making a total area of 124 acres 2 roods, instead of, as now, only 20 acres 3 roods. This block is located on a small mountain stream, which joins the main river to the south, and its situation in a direct line bearing 335° from the township of Bulalacao is about $4\frac{1}{2}$ miles.

Most of the intervening country is an extensive flat, extending on both sides of the river Bulalacao.

This area of level country does not appear to be subject to inundation. It is fairly well timbered by numerous belts of good timber of large size, suitable for mining purposes and railway timbers, which, together with the large forests of good timber existing on some of the ranges near the mines, provides an unlimited supply for all purposes at a very nominal cost when compared with other coal fields, where all timber required for mining has to be brought—sometimes from over the sea—from other parts at a big cost to the mine owners.

The river Bulalacao, though fairly a large stream near the coast, in its course passes close to the southern boundary of the concession, while its source extends far beyond it to the east, but it is of no use as a means of transport. During eight months of the year the water in the upper reaches and down to within about 2 miles of the coast almost entirely disappears in the bed of the channel. This stream is influenced by the tides for about one-third (in a direct line) of the distance to the mines, but the entrance to it is closed by a sand bar, which at low water is almost dry.

The rise and fall of the tides at Bulalacao is about $3\frac{1}{2}$ feet.

A small mountain stream passes through the concession and runs into the Bulalacao. This stream is flanked on both sides by fairly high ranges, which contain numerous coal seams. And it is in the bed of this stream that the several coal seams, numbered from 1 to 6, have been exposed by the rush of storm water.

The place where seam No. 1 is exposed in the stream has been fixed as the point of departure or center of the concession, the boundaries of which extend from this point 145 meters to the north, south, east, and west.

COAL SEAMS.

Seam No. 1. This seam is well defined and is 9 feet thick, the strike or trend being SW. and NE. by E., extending into the hills on both sides of the stream, and the underlie is about 25° to the south.

The seam has been opened out on the west side of the stream to a distance of about 3 meters, and it appears to rise as it enters the hill, the coal seam becoming more compact and of better quality. From this seam I had taken out about half a ton for a sample.

Seam No. 2. Is located about 60 meters up the stream from No. 1, and is 6 feet in thickness. The strike appears, from the little that has been exposed, to be about NNE. and SSW., and rising as it makes out into the hills to the west. The underlie is to the east about 20° . Only about $1\frac{1}{2}$ meters of its length have been exposed, showing a fairly compact seam of good coal. From this seam I had 5 hundredweight (about) taken out for a sample.

Seam No. 3. Is farther up the stream about 64 meters in a northwest direction from No. 2. It is about 7 feet thick, but not quite so compact in the seam as the others. No work has been done to open it beyond just breaking into it. It appears to run deeper below the surface and to cross the stream at a lower level. The strike appears to be SW. and NE., with an underlie to the east of about 23° . No samples were taken from this place.

Seam No. 4. This is a well-defined and large body of coal, 12 feet thick, with

apparently the same strike as No. 3—that is, SW. and NE. The underlie is about the same, 23° to the east. It is situated about 50 meters to the NE. of No. 3. This seam, though not much work has been done on it, is opening up very well and is very promising, showing at a depth of $3\frac{1}{2}$ meters from the surface and 3 meters cut in from the stream on the west side a compact body of coal right through the seam. This seam exists on both sides of the stream. From this place I took away quite a ton of the coal for a sample.

Seam No. 5. Is 3 feet thick and solid and is situated only 30 meters upstream from No. 4. The strike is about the same, SW. and NE., but it is more vertically inclined, standing at about 40° easterly. Only about 2 meters of this seam have been worked, and I took a sample from this of about 5 hundredweight.

Seam No. 6. Is still farther up the stream, about 120 meters from No. 5. It is 3 feet in thickness and shows a nice compact seam with a NNE. and SSW. strike, and has an easterly underlie. This seam is exposed on the west side of the stream, but no work has been done on it other than stripping the surface to find its width.

There are also two outcroppings of coal situated high up on the eastern slope of the western range.

These outcrops, though separated from each other by a distance of about 18 meters and are at different levels, 30 and 40 meters above the stream where Nos. 3 and 4 seams show out, may possibly turn out to be a continuation of those seams.

These several coal seams are all crossed by the small stream running through the block, and they extend beyond into the hills on both sides. They are all conveniently situated close to each other, the distance between Nos. 1 and 6, following the sinuosities of the stream, being not more than 325 meters. They can all be connected by a side cutting at the foot of the range following the stream, from which all the necessary adits would be led off to work the coal seams either to the right or the left. Thus an abundant supply of coal would be got at the start without the expense of sinking a shaft for several years to come. The surrounding country is very promising in appearances and has all the characteristics of a large coal field.

Although scarcely any work has been done by way of opening up the several seams beyond that necessary to ascertain their thickness and direction, it has been sufficient to prove that coal does exist in more or less large seams and that it improves in quality the farther they are worked into.

The coal is semibituminous in character and bears a strong resemblance to many of the Australian coals. It gives off very little smoke and burns to a fine white ash without clinkers, and is a good steaming coal. This was proved by a practical test I had made of 2 tons on the steamer *Bolinao*, all of which was surface coal, the greatest depth being not more than 3 meters, and taken from four different seams, as follows: Seam No. 1, about half a ton; seam No. 2, about 6 hundredweight; seam No. 4, a little over a ton; seam No. 5, 5 hundredweight.

These coals when put on the steamer weighed only 2 tons. I had intended to get about 16 tons, sufficient to run the steamer from Bulalacao to Manila, but labor being scarce and very bad I was only able to get the 2 tons.

On the 27th of January, 1898, and when the steamer had got on her way and was well out from the land, we made the trial, which lasted seven hours, from 4.30 to 11.30 p. m. When starting this trial at 4.30 p. m. the gauge showed 60 pounds pressure. The fires from Australian coal were then drawn and the ash pits cleaned out before firing up with this new coal. While this was being done and the new fires getting into good order the pressure in the boilers fell to 50 pounds, but it very soon went up to 55, 58, and 60 pounds, and kept steady at that without any trouble during these seven hours the coal lasted. During the last three hours we experienced a very rough sea. It burned well and freely and with only a little smoke of a very light color, and made only a small percentage of fine white ashes, free from clinkers. These 2 tons made only 400 pounds of ashes. It appeared to me that this coal

required not so much stoking as the Australian coal did. In this I am borne out by the chief engineer, whom I requested to note independently the result of this trial and record the same in his official log. This, I understand he did.

Although the coal was taken from the surface, down to a depth of only 3 meters, and from four different seams, the result of this trial was very satisfactory and showed that it is a good steaming coal, even on the surface, and will bear comparison very favorably with Australian coal, the difference being only about $14\frac{1}{2}$ per cent in favor of the Australian, which is very little when the difference of depths which these two coals are worked is taken into account, one on the surface almost and the other from a great depth. When these seams are opened out and worked farther into the mountains this difference will disappear, and, in my opinion, a coal equal to the Australian will be produced and in large quantities.

Judging from what I have seen, and basing my calculation on the usual practices and rules laid down for calculating contents of coal seams when inclined, I estimate that there are about 1,500,000 tons to be got out of this block, assuming of course that no fault or break occurs in the several seams.

Besides coal, there are on this property large quantities of iron hematite, which might prove a source of revenue outside of that got from coal, if only a small furnace was erected. The screenings and small coal could be used for smelting it into pig iron, instead of being dumped down as a waste product.

All these seams are most conveniently situated for working economically, requiring little time and expense to open up, so that coal could be turned out almost at the start. Timber in abundance for all requirements is at command and the mines are within a short distance of the bay, where there is secure anchorage and a safe port to load at any time of the year.

Transport by the river is not available. Therefore, to bring the coal to the seaboard with the least trouble and handling, a light meter gauge railway not more than 6 miles in length will be required, as well as a jetty long enough to reach deep water (say, 6 fathoms).

There are no engineering difficulties to contend with in constructing this line, though possibly a couple of bridges may be required if, when the survey has been made, it was found the line could be shortened somewhat by erecting them.

Most of this line would traverse over a level country, where the embankments need not necessarily be more than 3 feet high, and could be formed from the side ditches.

At the north end there would be some small cuttings necessary to bring the line to the coal workings, but at the south end there would be more cutting required to get through the range of hills that skirt the coast line. I have no doubt that when cutting through this range coal seams will be found, for it is in this range, but a little more to the west, where the P. P. Recoletos concession is situated.

The materials from this cutting could be used to make the solid part of the jetty over the shallow portion which extends out for a long distance. The end of the jetty would have to be on piles, with the necessary fenders for ships to lay alongside.

In reference to the mines of the Recoletos Fathers he says:

Unfortunately, I was unable to make a satisfactory inspection of this property, not having the time, nor was I able to see the coal seam said to have been worked in the addit, on account of the workings having all fallen in.

This block is well situated on the eastern slope of the range on the west side of the bay, and is only about $1\frac{1}{2}$ miles from the coast. It is easily accessible by a large gully, which leads from the coast right up to the mines, which are situated almost at the base of the upper stepping of the range. The surrounding country is carboniferous and looks promising.

There are many small seams of coal varying from 11 to 12 inches in thickness to be found in the several small streamlets that run into this gully.

At the head of this large gully a drive or addit has been made into the hill, following the coal seam, about $1\frac{1}{2}$ meters thick (so I was told), for a distance of about 5 meters. Unfortunately this addit is closed up, having fallen in for want of timber. The samples of coal I found strewed about the entrance of this addit appears to be more of a black shale, very dull, and breaks with a clean cleavage like slate, and is not at all like the coal from Antonio Yribar's block, though possibly, and I am inclined to think there can be no doubt but that good coal will be found when properly prospected for.

The surroundings have all the appearance of being a likely coal field, and on that account I think it very likely to turn out well if further prospecting is carried out. Should this prove so, it can easily be connected with the coal depot near the coast at a very small cost by a small tram line, which could be so graded that the loaded wagons could travel down by gravitation and the empty wagons be taken back by horses. There is an abundance of good timber within easy distance for all requirements.

In his general conclusions, Engineer Fenton, who seems to have made a very careful and extended examination of the entire Bulalacao proposition, says:

Judging from the results of my inspection and the trial of the coal made on board the S. S. *Bolinao*, there can be no suggestion of doubt in my mind that the district in which these coal concessions are situated is and will prove to be an extensive and valuable coal field when properly explored.

The block in the name of Antonio de Yribar appears to be somewhere near the center of it, and with abundance of coal on it ready to be cut out, as well as large quantities of valuable iron ore, hematite, and situated as it is within 6 miles of a good and secure harbor for ships all the year round, together with its close proximity to Manila, must commend itself as a valuable property and one that could be worked with little expense for several years, turning out any quantity of coal in proportion to the labor employed and proper management.

The other block of P. P. Recoletos is also favorably situated, and I think it only requires more prospecting. Its general appearance and the fact that coal does exist warrants better attention given to it. Should this be done, I feel sure the results would be satisfactory.

All the facts carefully considered tend only to one conclusion—that is, that the property as a coal field is a valuable one, and, in my opinion, will afford to enterprise a good reward for the investment of a moderate capital.

The group of eight mines of Napisian and Siay referred to in this chapter were all titled to Rafael Cuscoroa y Martinez, and it is said that these properties have passed into the hands of a large and wealthy firm of Manila. I have, however, been unable to learn who the real claimants for the property are. It seems quite certain from reports from reliable parties that a portion of these locations are made upon coal seams that are on high ground, while the rest are on lower ground and can not be practicably worked because of water. The properties have been little developed or worked, if at all, as might be expected from the date of the concessions, in 1893, the insurrection of 1896, the Spanish-American war, and the insurrection of 1899 having covered the larger portion of the time since the issuance of the titles for said mines.

The archives of the mining bureau also disclose the fact that up to the

year 1895 no licensed superintendent had been presented by the concessionary, as required by the existing laws, to be placed in charge of the work of these mines, and that the legal labor of four men for one hundred and eighty-three days in the year for each *pertenencia* had not been furnished. The reasons alleged by the concessionary, and said to be well founded in the report of the inspector of mines, were that the island of Mindoro, on account of its scarce population and its slight security, and because of a soil and climate which are very unhealthy, presents exceptional circumstances for the exploitation of coal mines there, and therefore it was recommended that the legal visit and examination for the year 1895 be omitted, with notification to the concessionary that in the future a strict compliance with the provisions of the law would be insisted upon.

In the year 1896 an attempt was made on the part of Martin Buck and Joaquin Casanovas to obtain the cancellation of the mines "San Claudio," "Prudencia," "San Armando," and "San Clemente," for the reason that the concessionary had failed utterly to perform the labors of development upon these mines as required by the regulations. Four petitions were filed for these properties, and these were remitted to the inspectorate at Manila for the purpose of publication of notice in the Manila Gazette. The petitions were returned to the politico-military governor of Mindoro for procedure in accordance with the provisions of the mineral code, but it seems that the governor had views of his own in reference to the method of procedure, and he proceeded to return the petitions to the petitioners, and also the letters showing the deposit of the reglementary fee of \$37.50 for each petition. Upon appeal to the inspectorate these petitions and letters of deposit were again returned to the governor of Mindoro, with instructions to proceed in accordance with the law of mines in force and the regulations. From this time nothing further appears upon the records of the inspectorate, and from the fact that these mines appear in the list of mines with no evidence that the title has been canceled it is presumed that the opposition of Martin Buck and Joaquin Casanovas was abandoned.

A curious incident in the original attempt at the location of these mines by the present concessionary is an opposition presented by one Antero Sanding, objecting to the registry of the mines for the reason that he was the owner of the ground they occupied, having held and worked them as coal-mining properties for the period of sixteen years. In passing upon this alleged opposition the inspector of mines calls attention to the fact that, notwithstanding the fact that the engineer of the *Patino* and the inspector of mines, Centeno, had both visited this locality within the alleged period, they make no mention whatever of any coal mines in operation in the island of Mindoro, or there being any worked deposits observed by them in that neighborhood, as

it is certain they would have done had such been the case; and in any event that it is certain no coal had been shipped from Mindoro, and that not a single word is found in the archives of the inspectorate of mines from the claimant Sanding, and upon investigation of the claim of this alleged claimant it was summarily disposed of. There are no further documents in the archives of the mining bureau relating to the coal of Mindoro, and the conclusion of the whole matter may be summed up in the statement that the coal mines of Mindoro are entirely undeveloped, and, so far as known, only partially prospected, as shown by the report of Engineer Hill.

CHAPTER XVIII.—REGULATIONS FOR SUPERVISION AND INSPECTION.

The first and second paragraphs of the “general provisions” of the royal order of May 14, 1867, provide:

1. Overall mines and mining establishments the government of the islands, through the engineers, shall exercise that vigilance and inspection necessary to compliance with this decree and with the regulations.

2. The regulations shall determine the form and manner in which said inspection shall be exercised, and whether there be any kind of opening and development of mines which demand the direction of an engineer or professional aid who may serve as such professional or as expert and who shall be excepted from other obligation.

On April 6, 1878, as a result of the application of the association “La Paz” for the continued loan of a Government engineer to superintend the development and working of their coal mines in Albay, a royal order was issued, by the second and third provisions of which regulations were ordered to be prepared and submitted for the suitable supervision of mining exploitations by engineers and providing for provisional appointments in the meantime. These provisions were as follows:

3. That, in order to facilitate the advancement of these enterprises, your excellency submit in the shortest possible time a system of regulations which should be formulated for the most suitable supervision by engineers of the mining exploitations under the first and second general provisions of the royal decree of May 14, 1867.

4. That while these regulations are being published your excellency provide that persons in charge of coal mines in the capacity of managers shall be engineers or superintendents of mines, with diplomas as such obtained in Spain or in a foreign country, to the end that they may unite the necessary and proper skill for the management of mines to advantage and guarantee the successful outcome of the interests placed in their charge and the police and sanitation, as was provided by the royal order of July 22, 1876, for the same company of “La Paz.”

On August 23, 1890, a royal decree, which was published in Manila on October 16, 1890, among other things contained in said decree, stated:

That in spite of the dispositions of the royal order of April 6, 1878, a person without a professional diploma from Spain or a foreign country can continue directing

the working of coal mines of Cebu, approving the authorization ceded by the governor-general to that effect; but considering that the safety and health of laborers in the mines would not be sufficiently protected if the fourth provision of said royal order were abolished entirely, it is therefore resolved that the said provision remain in force in its entirety, as the inspector-general of the department proposed, for those coal-mining exploitations whose annual production exceeds 5,000 tons, and that those whose production does not reach that amount can be managed by persons who, without having a professional diploma, show sufficient technical or practical skill before the inspectorate in the form that the superior authority of these islands determines upon for this purpose, it being at the same time the wish of His Majesty that the intendencia de hacienda be advised through the General Government that in forming the preliminary estimate for 1891 they include the amounts necessary for the increase of the staff of the mining department with an engineer and an experienced assistant as is now required for the suitable discharge of the duties assigned to the inspectorate of the department.

Under the implied authority, and to complete the instructions of the royal order of April 6, 1878, and that of August 23, 1890, which refer to the working of mineral coal of these islands, the governor-general on October 28, 1890, issued the following instructions, making them apply only to the island of Cebu:

1. The persons who, as professional directors, place themselves at the head of coal workings whose production should be more than 5,000 tons annually must be engineers or superintendents of mines, with certificates as such, obtained in Spain or in a foreign country.

2. For this purpose the proprietors of this kind of workings, or companies owning the same, shall present to the general directorate of civil administration a petition, accompanied by the certificate, which shall accredit their professional faculties. These certificates shall be examined by the general inspectorate of mines, which shall issue an opinion as to their validity. In case they should be declared valid, the General Government shall issue the competent personal authorization to the petitioner for the exercise of his profession in these islands, to be written on stamped paper of the fourth class if the certificates should be from foreign countries. In the latter case the ministry of colonies shall be informed of the authorization granted.

3. The contiguous mines or groups of mines which have been allowed concentration of labor in accordance with the legislation of the department, and whose production should not be 5,000 tons, may be directed by persons who do not possess professional certificates above mentioned, provided they obtain the special authorization specified in the following article:

4. To obtain this authorization it is necessary: 1. To be over 25 years of age and to prove in any way that may appear sufficient that they have been foremen in charge of workings or professional operatives in any mining work, national or foreign. 2. To prove before the general inspectorate of mines practical competence on the following points:

Idea of how strata of coal, and particularly those of lignite and the rocks that generally accompany them, lie.

Manner of sinking shafts and running galleries in coal and country rock. Timbering, and more especially shoring.

Natural ventilation and how it may be accelerated in necessary cases.

Lighting; precautions.

Workings of profit in coal strata.

Drainage of workings in the most simple cases.

Extraction and transportation of the products in the most simple cases.

Classifications, cleaning, and storage of coal.

Workings of the compass and most elementary manner of drawing a plan of the workings.

Slight legal knowledge of the duties and rights pertaining to a mining concession in these islands.

5. Those who wish this especial authorization shall direct their petitions to the general inspectorate of mines, accompanied by the documents already cited and the certificates that may be deemed convenient. The inspectorate shall fix the day for the practical examination of the petitioner, after which a record shall be made of it, which shall be attached to the above document.

If the result of the practical examination should be favorable, a copy of the record shall be made on stamped paper of the fifth class, which must be viséed by the most illustrious director-general of civil administration, and this document shall serve as a basis for the authorization which the latter, upon the recommendation of the inspectorate, shall grant the petitioner to direct coal mines whose production does not amount to 5,000 tons.

6. In order that these instructions may be duly complied with, the general inspectorate of mines, represented by an engineer, shall make the yearly regulation visit, verifying more especially the production of the mines classed according to article 3.

7. If, as a consequence of the visits, the engineer should find that the yield of the mines is greater than that which their professional director may authorize, the punishment provided for the cases by article 49 of the royal decree of mining in force in these islands shall be imposed upon the company or owner.

The fine shall be collected by the chief of the province under his own personal responsibility.

The mine owners may protest against the penalty imposed, applying to the general directorate of civil administration, which shall definitely decide the question after hearing the general inspectorate of the department, in conformity with article 84 of the said royal decree.

On February 3, 1891, this code of instructions, having been examined and approved at Madrid, was declared to "fully merit the end in view, viz, to facilitate exploitations of coal without detriment to the obligation of the Government to protect workmen," and "it has been deemed proper to approve said instructions," and they are "made general and applied to every portion of the archipelago."

Under these new provisions, or more properly speaking, the instructions to make effective provisions already existing, a system of annual visits to the coal mines, by engineers from the general inspectorate of mines, was inaugurated and maintained, and an honest attempt seems to have been made to carry out the spirit and letter of the law. It resulted in a marked improvement, and, in fact, marks the commencement of a new era in coal mining in the Philippines.

This commenced the last period under Spanish administration, and in it there might have been several coal mines successfully established in the islands had the Government done its part toward the general plan. The coal miners needed roads and bridges. Nor was this demand confined to the coal-mining industry alone; all industries required these means of transportation; but this want was not supplied, and the burden of constructing these public improvements, or in lieu thereof,

constructing narrow-gauge railways, many of them of considerable length, in order to connect their mines with the coast, fell upon the coal companies. In return for this assumption of the obligations of the State by individuals, the Government, on April 1, 1891, proceeded to establish an export duty of 50 cents (Mexican currency) per ton (of 1,000 kilograms) on all foreign coals. The coal companies faced these new conditions with a commendable spirit, and despite the additional and unwarrantable expense of building roads and bridges that the State should have built, the smallness of the capital available, the difficulty of securing constant and satisfactory native labor, and the interposition of a nonprogressive influence opposed to the development of the resources of the archipelago, and especially hostile to the advent of foreign capital and foreign interests, so rich were the deposits shown to be by the work carried on in the mines of Cebu and elsewhere that the coal industry of the Philippines came near to an established fact, as will be seen in the succeeding chapters. To be sure, the works described and the results obtained will seem more like a history of prospecting than real mining to those who are familiar with the development and working of the extensive lignite coal fields of the Pacific coast and the Rocky Mountains of the United States, still it represents a marked advance, and amounts to a demonstration of the great values in combustible that await the investor in Philippine coal lands under wise and liberal legislation and a live government conducted upon the basis of securing "the greatest good to the greatest number."

CHAPTER XIX.—THE NUEVO LANGREO MINES IN CEBU, 1887-1898.

In the months of June and July, 1887, as will be seen by consulting the Table No. II, five mines were petitioned for in the island of Cebu by one Celestino Martinez y Zapico, with the names "Magallanes," "Nuevo Langreo," "Cebuana," "Portiella," and "La Mestiza," consisting of 9 pertenencias. At some time thereafter, and before the year 1890, an association appears to have been formed under the management of the well-known resident of the city of Cebu, Mr. Florentino Rallos, under the name of Sociedad Nuevo Langreo. The five mines above enumerated were acquired by the association, to which, and in the same neighborhood, they added the mines "San Julian" in 1891, and the "Carlota" in 1895, of 8 and 1 pertenencias, respectively, making a total of 18 pertenencias, or 2,700,000 square meters. All of these properties pertain to the district of Danao. This company also acquired, in 1892, the mine known as "Nuestra Señora del Carmen," at Santa Rosa, in the district of Danao, which was later, and on the 10th day of March, 1894, by reason of failure to develop it, canceled by order of the governor-general of the islands. The same enterprising company also located a claim, through Florentino Rallos,

as manager, known as the "Mercedes," at the old workings of the Alpaco mine, in Naga, but this mine, titled in 1892, was also canceled in the year 1894. A short time before making an entry upon the Alpaco coal field, and in the previous year, Mr. Rallos, as manager for his company, had also made an entry of two mines, of 8 pertenencias each, under the names of "Josefa" and "Casilda," in the well-known coal field of Mount Uling, in Naga, titles for which were issued to Mr. Rallos, on behalf of his company, on the 16th day of May, 1891. These last two entries were also canceled in March, 1894, and became the basis of the MacLeod coal concessions, which form an appendix to this report.

The work of the Nuevo Langreo Company was confined to the group of mines first mentioned herein, together with the "San Julian" and "Carlota," and constituting what is popularly known as the Nuevo Langreo concessions in Danao. A detailed account of the operations of the Nuevo Langreo, so far as it is necessary to give a correct idea of the work in the Danao coal fields, constitutes the principal subject-matter of this chapter, the material for which is gathered principally from the reports of the engineers in their annual visits under the provisions of the law stated in the last chapter. We do not give these reports in full, since there is contained in them much extraneous and irrelevant matter that would only serve to add volume without general interest or value.

At the same time that the coal fields of Danao were being developed with more or less zeal by the Nuevo Langreo, the late Mr. Ramon Montañes was acquiring the title to and developing the Compostela group of mines, next adjoining the properties of the Nuevo Langreo toward the south. His initial entry was the "Angeles," of March 17, 1890. The Compostela group of mines will form the subject of the next chapter.

The first visit to the Nuevo Langreo mines was made by the engineer Abella in the month of February, 1890. At this time it will be remembered that the Nuevo Langreo's concessions were limited to the five claims first mentioned herein. Work of development was found to have been carried on only in the "Magallanes" and "Portiella," the work on the remaining three having been confined to the legal annual labor required for the compliance—a compliance, as in all cases of like character, purely formal—with the requirements of the concessions, demanding that for each pertenencia there should be performed each year the labors of four men for one-half of the year, or 732 days' work for each pertenencia. The company had, however, solicited the concentration of the annual labor under the provisions of article 78 of the regulations, which, in effect, provided that the labors upon a number of connected concessions might be consolidated and carried on at one or more points in case it should be for the best interests of the enter-

prise, and upon obtaining the consent of the superior civil governor of the archipelago.

On the "Portiella" the engineer reports two galleries: One opened below the legal labor, close to the level of the plain, which was continued for a short distance and then abandoned by reason of the poor condition of the vein. The other commenced above the legal labor, had attained a length of 34 meters, with a chimney for ventilation of 5 meters, and in which gallery no drifts for exploitation had been made.

On the "Magallanes," nearest to the Danao River, the legal labor gallery was found abandoned and caved in. Its indicated length was from 50 to 55 meters. Another gallery, closer to the river, had been run for a distance of 12 meters, and a transversal of 27 meters for the purposes of investigation. The cave-ins in the legal labor gallery were occasioned, naturally, by the exploitation of all the coal in the vein, drifts having been made to extract the coal. The intermediate group of the works had received the name of "Santa Barbara," and consisted of a transversal for cutting the vein some 21 meters in length. Seven meters of this entry had been provisionally refilled, in order not to renew the timbering often. A main gallery of 98 meters was run with an auxiliary gallery for ventilation, 50 meters in length, and 52 meters was excavated for chimneys, two connecting the lower gallery with its auxiliary and two connecting the latter gallery with the surface.

The upper group of the works had received the name of "Covadonga," and was found more developed than the others. A transversal of 53 meters had cut two veins, upon which galleries were opened, of 181 and 65 meters, respectively, with two auxiliary galleries, aggregating 147 meters in length. With the first vein there was found to be 76 meters in chimneys, and with the second vein 36 meters. To this was added the excavations for exploitation, consisting in the taking out of the upper portion of the levels of the auxiliaries and a part of the lower levels, in the second vein more especially.

The engineer sums up the entire work completed as 660 meters in galleries of direction, 101 meters in transversals of service and investigation, and some 164 meters in chimneys, making a general total of 925 linear meters. The surface exploited in drifts is estimated at some 500 square meters. The condition of the various workings in reference to timbering, ventilation, and drainage was found sufficient and was commended.

When taking into account that these mines were located in June and July, 1887, the above résumé of the work accomplished in two and one-half years is very small, considering, as we must, that for the nine pertenencias of this group there was required by the regulations and the law of mining 6,588 days' work for each year; but it shows a marked advance over the previous works in Cebu, and demonstrates

the wisdom of the system of inspection and supervision on the part of the government.

The visit for the year 1891 to this same group of mines was also reported by Engineer Abella, his legal visit having been effected in February of that year. The concentration of the labors had, in the meantime, been granted and it might be expected that there would be a much more extended development along some special line. This did not prove to be the case. On the contrary, it was found that the practice of indiscriminate works, carried on with a view to securing immediate returns in coal and without reference to the future welfare of the mines, had been the rule, calling for a strong rebuke from the engineer, and the threat of a fine if such robbery should be continued in the future.

From this report we learn that upon the legal labor gallery of the "Portiella" an advance of 48.50 meters had been made, and a ventilation shaft or chimney had been commenced and extended for only 5 meters without reaching the surface, and which chimney the engineer declared must be finished before the work in this gallery could be allowed to proceed. The vein here was found to be narrowed to 15 centimeters in thickness.

Upon the works of the "Magallanes," nearest to the river, the 12 meters of the previous year had been extended for 8 meters, following a vein of coal, from which all the coal available was taken out until reaching the level of the Danao River, and these works were then abandoned and were fallen in.

In the "Santa Barbara" group the gallery for transportation had been continued toward the SSE., until coming out at the surface, next to a small arroyo, in a length of 8.30 meters, drifting on the coal until it was entirely extracted up to the entrance of the transversal. Toward the NW. of the same gallery a gallery was driven in sterile rock for 5.37 meters, searching for the vein in a break, and in addition and on the border of the vein and break 28.85 meters was excavated in an oblique curved chimney which opened on the auxiliary tunnel or gallery at 25 meters from its mouth. On the other side of the same arroyo a transversal, running toward the north, was opened with the object of cutting the vein that was to be seen in the same arroyo, but at a distance of 5 meters this was abandoned and very properly so, proposing, as they did, to cut the same vein at a greater depth from the extreme NW. of the main gallery of "Santa Barbara."

In the works called "Covadonga" the first gallery was prolonged 8.60 meters, making a rapid turn toward the SW. and following the vein, and afterwards for some 2 meters in sterile work, a result which might have been foreseen from the violent turn that the vein makes at that point. Toward the SE. of the same gallery another bifurcation was made, directed toward the south in order to find the

first vein, since the gallery in this place followed the second vein, which was, in fact, found at some 8 meters distant. Here a chimney of from 10 to 15 meters was opened for ventilation and the new gallery had a total length of 29.50 meters. The gallery commenced the previous year at the SW. of the arroyo, in order to serve as an auxiliary to this portion of the vein of "Covadonga," was found fallen in, by reason of a work which was qualified as robbery, and which, for that reason, contrasted with all the other workings in that group, which, generally speaking, were well ordered and directed. The method of drifting and stoping was declared to be avaricious and reprehensible, and a fine of 200 escudos was promised for the next year in case the like methods were pursued. The transportation by small carts is condemned as costly and a substitute of some kind recommended, and for all distances greater than 50 meters.

The engineer, with that magnanimity of spirit so characteristic of that gentleman, declared that the company had, upon the whole, done well, and the conditions of the law as to the number of days' labor for the concentrated work had been furnished.

In the year 1892 the annual visit was made in the month of March by Engineer Antonio Vargas. The condensation of his report would seem to indicate that the gentle hint dropped by Señor Abella the year before and the exercise of his charity had not created an impression upon the company, for the work was not more vigorous and the results were not more prominent, as will be seen by the following abstract. It should be remembered that this year the "San Julian," of 8 pertenencias, was added to this group, the title thereto having been issued on May 16, 1891.

In the "Portiella," in the gallery farthest up from the legal labor, there has been an advance upon the 82.50 meters previously executed of 7 meters, the coal strata continuing to narrow at the back portion until it had a thickness of only 0.05 of a meter. In spite of the warnings of the engineer, given the previous year, the ventilation shaft or chimney was found incomplete, and the owners were warned not only to open this ventilating shaft, but also others in case the work should be further continued in that direction.

In the gallery "Santa Barbara" an advance of 39 meters was noted, and at a distance of 11.80 meters from where such advance commenced a ventilating shaft was excavated 20 meters in length and communicating with the surface through a chimney or vertical shaft of 8.10 meters in depth. This chimney, together with another connecting with the surface from the auxiliary gallery and 7.26 meters in length, made the circulation excellent and created an activity of the circulation in both galleries.

Upon the principal gallery of the "Santa Barbara," already completely abandoned, and before the proper time for the preservation of

the working, a rectangular bulk had been exploited, 35 meters in length by 15 meters in height. In this working it was impossible for the engineer to penetrate, and this completes the labor as stated, and the engineer emphatically declares that, considering the number of *pertenencias*, the requisite number of workmen have certainly not been employed.

Titles for the "Josefa" and "Casilda" mines, of eight *pertenencias* each, in Naga, had been issued to the Nuevo Langreo Company (through Florentino Rallos, its managing director) on May 16, 1891, and consequently these mines also came into the computation for the year 1891-92, and a fine of 100 escudos was levied for the failures in that group. A like condition was also found in the mines of Compostela.

The visit of Engineer Vargas in March, 1892, having developed the fact that the mining companies of Compostela, Danao, and Naga had not complied with the regulations with reference to the number of laborers required for each *pertenencia*, upon the report of such visit the inspector-general, Enrique Abella y Casariego, made the following report and recommendations, under date of April 4, 1892:

First. That the group of mines of the towns of Danao and Compostela have executed mining works, but not in sufficient quantity in order to cover the legal working population of the same as laid down in Article 50 of the Royal Decree of Mines, taking into account the number of *pertenencias* which each group contains.

Second. Absolutely no labor at all has been performed on the group of mines of Naga, situated at Mount Uling.

Rigorously complying, then, with the sixty-sixth article of the royal decree which governs mining in these islands, all the concessions of the mines of the island of Cebu ought to be canceled, since, in accordance with the sixth general condition set forth in the titles of property which were issued to them in due time, it appears that they were obliged to have the mines occupied with four operatives for each *pertenencia* during the half of each year.

However, by a strict and rigorous application neither the general interests of the province nor those of the state, nor yet those of individuals, would gain anything; although there are other coal deposits existing in the Philippines, analogous to these of Cebu, which are not solicited or worked, there are no other persons or companies found who solicit the deposits of Cebu in order to work them more actively, and by the cancellation of the present concessions there would only be secured the destruction of the small exploitations which already exist in Danao and Compostela, and the removing of the probability of a more important working. It is also to be taken into account that the infant mining industry of Cebu contends with difficulties inherent to every new industry, increased by the painfulness of mining labors, and by the lack of available roads, outside of three or four months during the year, for the extraction of their coal; and, therefore, it would be advisable in the present case to invoke article 53 of the royal decree, by which the most excellent governor-general has the faculty of reducing the legal laboring contingent for the mines one-half during a period which shall not exceed two years, whenever there exists difficulties in the exploitation and explorations of their deposits, such as exist in the present case and are easily proved.

At first view it appears that all of the groups visited in Cebu are not in the same condition, since the Danao and Compostela mines have made some work, although

not sufficient, and that of Naga or Uling has done absolutely nothing; but this latter group has not yet presented a superintendent for the works, which it is obliged to have in compliance with the instructions approved by the royal order of February 3, 1891, by reason of which no one has been able to mark out or direct the mining labors, and as by reason of this fault there has been imposed and collected a fine of 100 pesos, which is equivalent to four hundred days' work, it follows that with this penalty there is an equality created, to a certain extent, resulting from this fault, with those committed by the other groups, and therefore the general inspectorate believes that equity would decide that this rule can be applied to Danao, Compostela, and Naga alike, with only some supplementary restrictions.

Founded upon all of these considerations, the general inspectorate proposes to your excellency that this statement be sent to the most excellent governor-general that he may be pleased to decree the following:

First. That, taking into account the material difficulties with which the infant exploitation of coal in Danao and Compostela is struggling, that there be conceded them, for one time only, the dispensing of the legal mining population which has not been furnished, as is proved on the visit of inspection performed in the month of March last, but notifying the concessionaries respectively that if on the next annual visit this legal mining population is not found fully covered, that he will apply to them with full vigor the fiftieth and sixty-sixth articles of the royal decree of mining decreeing their concessions canceled.

Second. That there be conceded in the same manner an analogous dispensation to the group of mines of Uling, in Naga, with the same notification, but with the supplementary condition that for the year next following they shall have performed not only the labors corresponding to that year, but one-half more for this which they have failed to do for the present year, in order to be placed in the same condition with the group of mines of Danao and Compostela.

This recommendation was approved on April 8, 1892.

On the following year, and in the month of February, 1893, Mr. Florentino Rallos presented a petition on behalf of his company, in which he states "that in the group of mines of the Company Nuevo Langreo, situated at Camansi or Mantija, of the district of Danao, of this province, all of the workings are found in coal and worked by the necessary number of miners, but, due to the abundance in nearly all of the year past and the present from the production of sugar, especially in Danao, the coal which is extracted is lost by the exposure to the weather at the mouth of the mines by reason of the lack of beasts of burden, since all the carabaos of the pueblo that were employed in the former year in hauling down the coal to the warehouses on the coast are dedicated this year to working the fields and in the crushing of the cane, which in said pueblo is not small, and the condition of the sugar also, as related to the number of people in the working population. For this reason the enterprise, notwithstanding their having advanced the workings sufficiently, have not secured the number of necessary meters which accredits the working population marked out by the regulations of the department, and with the object of not incurring the responsibility" they ask of the governor-general the necessary dispensation for the year 1893.

Upon this report, Inspector Abella having made a formal recommendation in its favor, an operation of the labors were remitted under

date of March 17. This did not excuse the past failures, however, and the regular visit to the mines occurred on the 21st day of April, 1893, from which we condense the following facts:

In the gallery denominated "Escribana" there was found to be an advance of 48.32 meters, with a chimney of 5.64 meters from the auxiliary gallery for ventilation; an advance of 42.73 meters in the gallery called "Pilar," with a chimney commencing two-thirds of the distance from its mouth; an advance of 4 meters in the gallery of "Santa Barbara;" two drifts of 30 and 14 meters, which had been made upon the coal strata from the chimney which was noted the previous year, until within 1 meter of the face of the gallery, and a small shaft chimney which communicated with the oblique gallery opened upon the same break and pertaining to the works indicated by Mr. Abella on his last visit.

The first 35.18 meters of the gallery "Escribana," whose dimensions are 1.94 meters in height and 1.35 meters in width, taken from the inside of the timbering, have been opened transversally and in direction, the 13.14 meters remaining following a vein of coal from E. 25° N. to W. 25° S., with an inclination of 25° and with a trend to the N. 25° W., and 1.20 meters thick. The chimney of 5.64 meters follows the inclination of the strata. The rock which serves as walls is a clayey slate.

The first 18.98 meters of the gallery denominated "Pilar" are opened in sterile ground, and in an oblique direction to the strata, whose direction is from N. 32° E. to S. 32° W.; inclination of 33°, with a trend toward E. 32° S., and the same thickness as that of the "Escribana." At some 16.20 meters from the crosscut of the "Pilar" there exists, according to the inclination of the strata, a gallery chimney of some 28 meters in length, in an inclined measurement, and with a direction of W. 32° N.

The strata of the gallery "Pilar" is found, as in the "Escribana," between clayey slates, a circumstance which, with the others, such as inclination, direction, and thickness, causes one to suppose that they are the same. Also the trapezoidal section and dimensions of these works are identical.

The 4 meters advance in the gallery "Santa Barbara," following the direction of the strata, are easterly, according to the measurement made last year. The two drifts, in vertical cuts, exploited on the strata of "Santa Barbara," commence in the gallery chimney indicated in the former year, and they have an altitude of 2 meters and 30 and 14 meters of advance, leaving an intermediate bulk between "Santa Barbara" and the first of the drifts of 2.50 meters in height.

The small chimney of rectangular section has for dimensions 1 meter in length by 0.85 meter in width and a depth of 0.60 meter.

And this report ends with the words:

All these works, although they are directed with the best possible judgment in so far as regards their security especially, leave much to be desired by reason of the little activity with which this group of mines is exploited, causing it to lack much of having the requisite number of workmen.

The lack in the amount of labor which should have been done, as shown by this report, caused the inspector-general, Señor Abella, on the 13th of May, 1893, to make the following recommendation:

In accordance with the visit of inspection made on the 21st of last April to the group of mines "Portiella," "Mestiza," "Magallanes," "Cebuana," and "Nuevo

Langreo," and all of the group of Camansi, situated in the district of Danao, of the island of Cebu, there has been executed in the last year 134 meters of gallery and two drifts of 30 and 14 meters of advance, respectively.

Taking into account the work of procrastination of every class of labor before existing, and graduating it in the manner most favorable possible to those which have been made this year, yet it fails to cover even the total working force belonging to the 17 pertenencias of this group, to say nothing of the half of it, by virtue of the concession which was allowed by the superior decree of March 3 of the present year.

In accordance with the legislation of the department in force it should proceed to declare all the concessions of this group canceled, but renewing at this time the same considerations of toleration recommended for the group of Uling, there can be added in this case that it has been the first that up to this day, by its own modest and continued working, has practically demonstrated at the present time that the exploitation of coal mines is possible and profitable.

The punishment that, in accordance with the 49th article of the royal decree, ought to be imposed on these concessions in case that they are not declared canceled, ought, therefore, to be more light than that imposed upon the group of Uling, with so much the more reason as this was a repetition of the instances meriting a punishment. This general inspectorate understands a fine of 100 escudos will be sufficient, in order to hinder that in the future there be a lack of the reglamentary conditions of the concession for this group.

This fine was duly and promptly paid by the concessionary.

The visit of 1893 to the mine "Nuestra Señora del Carmen," at Santa Rosa, and the "Mercedes," at Alpaco, owned, as we have said, by the Nuevo Langreo Company, resulted in a report, "that, up to the present, they have not complied with any of the legal prescriptions obligatory upon them," but no action for cancellation was taken in the year 1893.

In the year 1894, however, a similar state of affairs existing, these titles were canceled in March, and at the same time also the titles of the "Josefa" and "Casilda," in Mount Uling. In the same month, upon recommendation of the general inspectorate of mines, the governor-general issued a decree suspending the admission of petitions for registration and investigation temporarily and for eight months in connection with locations in the valley of the river Pandan, from its source in the district of Uling to its mouth. On September 21, 1894, by a decree of that date, the temporary prohibition just stated was made permanent. This prohibition has never been removed.

Señor Abella himself made the visit to the mines of Nuevo Langreo in February, 1894, finding the works in a very unsatisfactory state, as shown by the extracts from his brief and concise report. Omitting formal statements in this report, we quote:

In the works called "Santa Barbara" there has only been made a small shaft of 7 meters vertical length and 8.75 meters inclination from the surface to the gallery for transportation, all in barren rock, with the object of ventilating the works of preparation which are being executed in consequence of the cavings in occasioned on the interior by reason of the rains and the refilling of the small exploitable region above the old auxiliary of these works. The cavings in, very visible from the sur-

face, indicate that the movements of the ground may have been propagated at the interior, prejudicing the good exploitation subsequently of the bed, so that the inconceivable slowness of the exploitation of these works, commenced before 1890, and the refilling completely of the stopes, already made, make the maintenance and reparation of the works and the subsequent exploitation difficult and resultingly costly.

In the works designated with the name of "Escribana" there has been made the following new works: 5.30 meters of advance in the principal gallery, or gallery of transportation; 15.60 meters in sterile rock to the surface; and 16 meters following the vein, first horizontally and afterwards inclined in the chimney made before the former visit; and another new chimney of 12 meters, with some 5 meters at its extremity of auxiliary gallery commenced in both senses. A total of 53.90 meters of linear labor, of which 38.30 meters are in coal and 15.50 in sterile rock.

In the works called "Pilar" there have been opened 9.80 meters in a small shaft opened in sterile rock in order to communicate the chimney indicated upon the former visit with the surface; 14.70 meters in a new chimney; and 15.40 meters of advance in the gallery for transportation, with respect to the length noted in the past year; a total of 39.90 meters of work in length, of which 30.10 were opened in coal and 9.80 meters in barren rock. In these works there have been made, moreover, 89 square meters in stopes.

The works designated with the name "Portiella" are already exploited and can not be visited. According to information acquired, which is verified by the cavings in which are to be seen on the surface, stopes for profit were made upon some 52 meters of vein, first opening a chimney of 6 meters in length.

In this manner it would result in some 260 square meters in stopes.

Therefore, among all the works, there have been executed during the year 349 square meters of exploitation in drifts and 115.55 meters of linear work, of which 74.45 meters were opened in coal and 41.15 meters in barren rock. These figures show the insufficiency of the labors of the 17 pertenencias concentrated, even counting, in addition, upon the costly repairs which are being made on the "Santa Barbara," and the procrastination of the timbering of these works of "Pilar" and of the "Escribana."

Outside of the "Santa Barbara" I could not visit, for the reasons above set forth; the general state of police of the remainder of the works is sufficiently acceptable.

The visit of the engineer in February, 1895, developed a most agreeable change in the Nuevo Langreo. A railway to connect with the mines and the coast was under way, and new signs of life and activity were present at the mines. The report of the visiting engineer is replete with detailed facts and figures, and extended to such a length as to render it impracticable for full quotations. For our purposes we shall quote some clauses in full, and in others compile and condense the facts and figures to show the actual condition of the workings.

In reference to the railway, which will be found noted on the map and plan of the Danao and Compostela mines, as at present claimed by Enrique Spitz, the engineer says:

From the town of Danao, situated on the eastern coast of Cebu, to the district of the Visita of Camansi, where these coal deposits are situated, is a distance of some 11 kilometers, leaving the highroad of Danao by the cart road to Santa Rosa, and then along the left bank of the river Danao to the mines. This road presents great difficulties, since it goes up the bed of the river itself for a distance of more

than 8 kilometers, and it makes the exploitation of this somewhat rich carboniferous bank a point little less than impossible, and which is, in our opinion, no other than the prolongation of that of Compostela.

In order to obviate these inconveniences, this exploiting enterprise has commenced with the greatest activity the construction of a narrow-gauge (0.60 meter) railway, operated by animal power (horses or carabaos), but so substantially constructed that in due time a steam motor can be substituted (a locomotive of some 4 tons).

This iron road was projected by the assistant of public works, Mr. Modesto Marte, and is, on the whole, identically the same as that we speak of in the visit to the mines of Compostela.

Commencing with a projected wharf (in our opinion difficult of establishing and preserving, because the cove which would serve for anchorage is very open and violent, being situated on the eastern shore of the sea, and, as we have understood, will be substituted for a service of steam barges, in our opinion, of better utility) it runs through the streets of the town and terminates at the mines.

The work is well advanced and is difficult because of its costly execution, such as works of strengthening grades in eruptive lands that have a tendency to move about and to become swollen, or in lands of little firmness formed by wash of freshets, and that demand stone intrenchments for strengthening, over very hard rocks on which it is necessary to use powder by reason of their not permitting the introduction of dynamite, which does not fail in being a difficulty of considerable consideration; and from the mountains of great height, because of the broken character of the country, and through which for its greater portion the road runs along the middle slope, skirting the central mountain range and the headwaters of this well-watered region.

The execution of these works is good and carried out with considerable skill, more especially when you take into consideration that it has not been possible to bring it to a state of full completion by reason of the line being broken by some cuts rendering the through transit impossible until these works are planned and executed.

This road supposes a very great courage, scientifically and economically speaking, that speaks volumes in favor of these miners.

The compiled figures show the result of the year's work at the mines:

“San Luis” working: A gallery divided into two zones, with a total length of 26.18 meters, 1.98 meters wide at the bottom and 0.94 meter wide at the top, and 1.76 meters high; timbering and ventilation good; 2 meters in clay, 23.68 meters in coal, and 0.50 meter in sandstone. This working is separated from the “Pilar” by the Danao River.

“Pilar” working: An advance in the general gallery of 20 meters, and an auxiliary gallery starting from a vertical shaft of 11.20 meters to cut the second chimney at 17.72 meters; prolongation of the second chimney 3.32 meters; exploitation by drifting in the portion comprehended between both chimneys and the auxiliary gallery; prolongation of the upper gallery 12.50 meters, following the direction of the general gallery and communicating with it by narrow passages; two narrow passages of 1.80 meters; a vertical shaft $\pm$ by 2 meters and $\pm$ meters long, which communicates with the second narrow passage; two entries to the right and left of the principal gallery, the one to

the left of 4.63 meters and the one to the right of 3 meters; another entry to the right, and parallel to the last, of 2.70 meters. For the purpose of computing the legal labor allowance, the above work is allowed as a total advance of 251.85 meters, which, as a matter of fact, is much in excess of the real advance.

“Escribana” working: This working was found completely fallen in, the coal having been completely taken out. The rubbish and caved-in workings were run over, and, as in the case of the “Pilar,” a like liberal and unreliable estimate was made, the total credit allowed being, advances by galleries, chimneys, and entries of all kinds, 91.20 meters and in drifts a space of 591 square meters.

“Enrique Abella” transversal; a new working: This was found extra well timbered, and the gallery was advanced 18.30 meters, its form being a trapezoid 1.95 by 0.95 meters in width, and 1.97 meters high. At 7.50 meters from its mouth a vein of coal of 0.35 meter in thickness was encountered, upon which no exploitation had been made. The workings were: 7.50 meters in clay; 0.35 meter in coal; 8.45 meters in clay again; 2 meters in sandstone.

This sandstone was very hard, of very fine grain, with quartzite veins, and crossed by narrow dikes of pure hyaline quartz (SiO_2), having the appearance of a granite of exceedingly fine grain.

The mine service was by means of small cars of three-fourths of a ton in capacity, an iron road of 0.60 meter of width running the length of the entire gallery, and prolonged in the same direction through an open cut outside the mouth for 7.49 meters.

At 2 meters at the outside of its mouth there was a switch, running in a curved line for 29.52 meters, where the cars were unloaded.

At the open space on the outside, between said gallery and the working of “Santa Barbara,” there had been established, first, a building for the watchman of the works; second, an inclined screen for screening the coal; third, following the course of the Arroyo Bairan, a box for washing coal, taking advantage of the natural slope or fall of said water course, at whose extremity the coal was collected in baskets.

“Santa Barbara” workings: These workings were censured upon a previous visit, and an attempt was made to rehabilitate them, under the advice given by the general inspector of mines. The result, figured in the same liberal way, credits these works with a general advance in the main gallery of 22.38 meters, in the upper galleries 21.30 meters, in narrow passages 59.30 meters, and in drifts 411.18 square meters.

The “Portiella” and “Covadonga,” mentioned in the previous years, were found totally abandoned.

In figuring up the result of the year a credit is given of 394.90 meters in lineal advance, and 1,204.98 meters in superficial advance, representing 11,798 days’ work, and by adding thereto 749 days for

the outside work the total of 12,444 days' work, or the full amount required for 17 pertenencias, is made up. In this computation no allowance is figured for the personnel employed in the work on the railway, nor of the employees of the carpenter or blacksmith shops.

Upon the whole the law seems to have been more than complied with, although the statements of advances made in the mines themselves are certainly exaggerated.

The visit for the year 1896 was made in February and March of that year, and his report states:

The road which connects the mines with the port extends some 9 kilometers, with two transfers, the first at Bonga and the second at Langob, the coal being carried in baskets, which are loaded at the mouth of a hopper which exists near the river Danao.

The advance of the workings in the past year is as indicated in the table which is inserted at the end of the report of this visit, and the state of them is as follows:

First. The "Pilar" working: This is exploited by retiring from the front face of the gallery toward its mouth. The ventilation is good and the timbering in the parts which are being worked are renewed in order to preserve it, and in the parts which are abandoned they are refilled with rubbish.

In the present year there is an advance of 5 meters in the general gallery acknowledged, 17.45 in chimneys and narrow passages, 375.66 meters in drifts.

Second. "Escribana" working: Completely abandoned and fallen in.

Third. "Jesusa" investigation: In order to cut a strata of coal which cropped out at the river, an investigation was established, which was abandoned because of its threatening to cave in at a distance of 12.20 meters from the open cut.

Fourth. "Jesusa" working: The same vein which it was supposed the "Jesusa" investigation would strike is reached by a gallery of the same name, which at present measures 33.83 meters, and in which two narrow passages have been made of 0.80 meter, united by a gallery overhead of 6.75 meters, and in its center a chimney which pierces to the surface at 8.61 meters in height.

Ventilation good. Timbering good.

Fifth. "Enrique Abella" working: In the transversal gallery and cutting a strong vein of coal of 1.75 meters, called "Juday." It is one of the most important and best developed in the exploitation.

The advance in the gallery is 58.41 meters. The road going to the face of the gallery is completed. The vein which was cut is exploited in drifts by a gallery of direction, with which a chimney communicates, which pierces to the surface, with an inclination of about 30° and 46.77 meters of length.

Between this working and the "Santa Barbara" there has been established a washing place, or, better said, the former one has been improved.

The road which starts from the mouth of the "Abella" also collects the coal coming from the "Santa Barbara" and carries it to an inclined plane of 17 meters in length and approximately 10° of inclination, terminating in a platform where the baskets are loaded.

Ventilation good. Timbering good.

For the present the presence of inflammable gases is not detected.

Sixth. "Santa Barbara" working: This working is still exploited in retiring from the face of the gallery, which advanced some 29 meters with respect to the former year, taking out by drifts all the coal up to the mouth, and abandoning it afterwards. At the present time the drifts are situated between the general chimney which connects with the surface and the fault to which we have attested.

Ventilation regular in general and good in the drifts.

Timbering, like the ventilation, ought to be attended to somewhat more than it is.

Seventh. "Mercedes" working: This working is suspended in order to commence it after a better knowledge of the direction of the vein. The coal is of a very medium quality. The length of the working is 17 meters. The ventilation is good. Timbering good.

Eighth. "San Luis" working: After the "Enrique Abella" this is of the greatest importance at the present time, and better employed. It has a development of 77.13 meters in galleries; 12.95 meters in an auxiliary; 12.61 meters in narrow cuts; 36.32 meters in upper gallery, and 14 meters in a vertical shaft. Besides the work in drifts, there is 375.66 meters. Ventilation good. Some of the bents ought to be renewed and a part of the roofing.

It is worked with safety lamps because of the inflammable gases existing. The thickness of the vein is more than 2 meters.

No record of a visit is found in 1897, due undoubtedly to the disturbed condition of the country, but we have an account of the visit in 1898, which was made in January of that year, which we give in full:

The works visited are:

First. "Enrique Abella" Transversal: This transversal, having its mouth within the pertenencias of the mine "Nuevo Langreo," has at the present time a length of 160.03 meters. On the occasion of the last visit it had 81.44 meters. Therefore there has been made an advance of 78.59 meters, of which 27.60 meters are opened in sandstone and the rest in clay. At 70.07 meters from its mouth two galleries of direction start to the right and left, by which a vein of coal 1.20 meters thick, with a trend towards the north, and inclined 28° , is exploited. These two galleries were already opened at the former visit, at which time that of the right hand had 11.32 meters and at the present time has 62.15 meters, until encountering the fault, and following afterwards with an investigation or prospecting entry of 36.50 meters in length, seeking the vein. Wherefore it results that an advance of 50.83 meters, besides the investigation gallery of 36.50 meters, has been made on it. On its right face there is established three chimneys, which reached to the surface. The first one, at 15 meters from the crossing, has a length of 50 meters, following the inclination of the vein. All of it was in coal with the exception of the last 3 meters, which are in vegetable earth. The second chimney has a length of 33 meters. It was opened in coal, following the inclination of the vein for the first 32.50 meters, and the other 2.50 meters remaining has been in vegetable earth, and the third chimney has 20 meters of length, having its mouth at the fault. Through these chimneys drifts are established, all the coal being taken out and filling in afterwards, leaving only a bulk of 3 meters nearest to the crossing, working having been made in drifts to the extent of 1,760 square meters. In the gallery of direction, on the left hand side, likewise it has been advanced until it has a length of 100.66 meters, of which 11.35 meters were counted at the last visit. Its advance, then, has been 89.31 meters. On its left face there has been opened 4 chimneys and 10 narrow passages or cuts. The second, third, and fourth chimneys were opened since the former visit, following the inclination of a vein of coal, and each of them has the following length: The second, 41.10 meters; the third, 34 meters, and the fourth, 26 meters, there having been established in them drifts which have taken out the coal for an extension of 1,916 square meters. There has been left in it a bulk of coal of 2 meters on an average.

In résumé: In this gallery there has been made an advance on the transversal gallery of 78.59 meters, and, besides, the installation of a narrow-gauge road for carriage; in the right-hand gallery of direction, 50.83 meters, and in the investigation or prospecting gallery, 36.50 meters; and in the gallery of direction on the left hand 89.31 meters and the installation of a narrow-gauge road; in the chimneys at both sides,

186.31 meters; in narrow passages or cuts, 20 meters, and in the entire exploitation by drifts, 3,676 square meters.

The timbering is good, due to some of the old bents having been made strong, which were found in a rotten condition, and its ventilation in the drifts is good. At the face of the transversal gallery it is somewhat difficult, and it is desirable that it should be made more active.

Second. "Nueva Jesusa" workings (new): This transversal gallery was opened at a lower level than the old gallery "Jesusa." In this a working of 58.49 meters in length has been made, preceded by an open cut of 2 meters. At 25.35 meters from its mouth it cut a vein of coal, and a gallery was opened from the right hand, following the direction of the coal vein already previously cut by the old working "Jesusa" at an upper level, until arriving at the first inspection galleries of the old "Pilar," reaching, therefore, a length of 63.60 meters. The vein was exploited to the shaft of the old working "Jesusa," a working in drifts having been made of 224 square meters. At 51.71 meters from the mouth another gallery was opened from the right-hand side on account of another vein of coal having been cut, having a thickness of 0.42 meters, trending toward the east and at an inclination of 85° , following always in clay and coal until reaching a length of 13.71 meters. At the mouth of this gallery a chimney in the roof, following the inclination of the vein, reaches the surface with a length of 25 meters, its section being 0.80 meters by 0.60 meters.

In résumé: In this gallery the advance of 15.44 meters has been made in sandstone, and the rest in clay and coal. Its ventilation is good, and its timbering is not in a good state by reason of the works being already abandoned.

Third. "Espina" working (new): This working of new execution has a total length of 92.47 meters, preceded by an open cut of 6 meters; at 38.28 meters from its mouth the first chimney in the roof was opened, which reached the surface in a vertical sense with a length of 3 meters. At 62.97 meters a vein of coal was cut of 0.47 meters thickness, trending toward the east and at an inclination of 38° , the second chimney being opened at this point entirely in coal until it arrived at the surface with a length of 11.50 meters, following the inclination of the vein; and at 68.87 meters from the aforesaid mouth another vein of 6.56 meters thickness was cut, following the same inclination and trend as the former. At this point the third chimney was opened, following the inclination of the vein and reaching the surface with a length of 12 meters. These last two chimneys communicate between themselves by means of an upper gallery of 5 meters, following afterwards to the face of the working, in a length of 3.55 meters, cutting the vein of coal and leaving a thickness of 2.10 meters. At the face of the gallery the former veins were cut again by reason of a break of 2.50 meters occurring in them at 87.89 meters from the mouth.

In résumé: In this gallery 92.47 meters are in clay; the two chimneys of the upper gallery in coal and clay, and besides, a narrow-gauge railway for carriage has been instituted in it. Both the timbering and the ventilation are good.

Fourth. Transversal gallery "Calderon" (new): The transversal gallery "Calderon" is situated at the lowest level possible of the pertenencias which compose this group; its present length is 95.06 meters, opened in clay, with the exception of 5.20 meters, which are in sandstone. It is preceded by an open cut of 7.60 meters. At 23.73 meters from its mouth, and in the left face, an investigation gallery of direction has been opened perpendicular to the transversal gallery, which has a length of 6.70 meters, cutting a vein of coal of 1.07 meters in thickness, with an inclination of 35° , and trending toward the west. At 27.08 meters the first chimney was opened in the right face, with an inclination of 85° and a direction perpendicular to the transversal gallery, reaching a length to the surface of 23.30 meters, opened in clay. At 37.08 meters there is encountered the first narrow cut, having its mouth in the right face and connects with the first chimney by means of an upper gallery. At 45.34 meters, and in the right face, there is found two cuts or narrow passages, which

communicate with the first and the chimney by the upper conduit. At 59.49 meters, and in the right face, a shaft is encountered of 40° of inclination, with a length of 11.36 meters, reaching the surface by a vertical shaft of 3.72 meters; this shaft has a section of 1.23 meters in height by 1.21 meters in width, and communicates with the two narrow passages and the chimney by means of an upper gallery which has a total length of 33 meters, leaving a bulk of 3 meters. Through this shaft the coal mined in the transversal gallery "Enrique Abella" is raised, going out by the mouth of this new transversal gallery to the washing plant newly installed at the river and nearest to its mouth. At 82.93 meters from the mouth of this transversal gallery, and in the left face, the second prospecting gallery is found, with a total length of 14.70 meters, that cuts a vein of coal of 1.10 meters thickness, with a trend toward the east, and inclined 35° ; and at 84.43 meters, and in the left face, the second chimney is found, opened in clay, and inclined at 2.62 meters, communicating with the surface afterwards through a vertical shaft of 7.07 meters in length.

In résumé: In this transversal gallery, besides the 95.06 meters, there has been made in prospecting entries, 21.40 meters; in chimneys, 32.99 meters; in upper galleries, 33 meters; in narrow cuts, 6 meters; in the shaft, 15.08 meters; and in an open cut, 7.10 meters; and, besides, the installation of a narrow-gauge road for carriage. The ventilation and timbering are good.

Fifth. "Conchin" working (new): This labor, having its mouth toward the east of the old "Pilar," at present is fallen in, having reached a length of 18.60 meters in a direction parallel to the aforesaid "Pilar" working, and proved by the sunken earth.

Sixth. "San Jose" working (new): This gallery is opened toward the southeast of the new gallery, "Espina." It has a total length of 51.45 meters, and its mean direction is SSE. At 17.90 meters from its mouth it cut a vein of coal of 0.95 meter thickness, with 37° inclination, and trending toward the east. At this point a chimney was opened, following the inclination of the vein, reaching to the surface with a length of 4.65 meters, and leaving in it a bulk of 2 meters. Above the vein an upper gallery was opened toward the face, with a length of 12.17 meters. This working is abandoned, cave-ins having been commenced in it.

Seventh. "San Luis" working: This working, since the last visit, has advanced for a distance of 31.30 meters. At 6.30 meters on this advance a fault was encountered, and the auxiliary was prolonged 19.60 meters to the fault. At 5 meters from the face a vertical shaft of 8.40 meters was opened; all the coal was exploited up to the fault, having made a working in drifts of 240 square meters, following the vein in retiring, and this gallery, which at present is fallen in, was abandoned.

Eighth. Old "Jesusa" working: In this gallery the working was advanced, since the last visit, to 20 meters of length, until arriving at the refilling of the old "Pilar" working. Two drifts were established at 2 meters from the front, all the coal being taken out, and afterwards abandoning it. At the present time it is fallen in; the advance in drifts is 176 square meters.

Ninth. In the old working "Santa Barbara" the work was continued with drifts in the act of retiring until all the coal was taken out, a labor in drifts having been made of 85 square meters; at the present time fallen in.

Tenth. In the gallery "Mercedes" no advance of any kind has been made and it is at the present time abandoned.

GENERAL RÉSUMÉ.

Advances in galleries, 663.41 meters, of which 48.24 meters are in sandstone and the rest, 615.17 meters, in clay and coal; in auxiliary galleries, 19.60 meters; in prospecting cuts, 57.90 meters; in upper galleries, 53.72 meters; in chimneys, 274.84 meters; in shafts, 23.48 meters; in open cuts, 15.10 meters; in narrow passages, 26

meters; and in drifts, 4,394 square meters; and, besides, the installation of a narrow-gauge road to the length of 355.43 meters, and the establishment of new coal-washing places at the river.

The general state of safety and the sanitary condition of the working is good, except in those workings which at this visit are cited as abandoned or fallen in.

This last report brings the history of the Danao coal fields, under the administration of the "Sociedad Nuevo Langreo," down to the Spanish-American war, and, as will be seen by the results obtained by the report for the year 1898, which we have quoted almost in its entirety, a very satisfactory progress was made. Evidently the general manager of this company, who is known to us by reputation as a practical and careful man of business, and his superintendent and other employees at the mines were learning at last the real conditions in reference to the character of the deposits of coal at Danao and their manner of lying, which would have resulted, in the course of the next three years, in placing the Danao mines upon a paying basis, and would also have discovered—what I believe exists at that point—a far more regular and superior class of combustible.

Measured by the extensive lignite coal mines with which we are familiar, the working, it is true, seems but a trifle, but when judged by the many adverse conditions that prevailed and which the reader of the history of these islands will recognize without enumeration and which can be found in this report by the careful reader, the workings of the "Sociedad Nuevo Langreo" are easily recognized as an advance in the coal-mining industry of the archipelago of no small value.

To this volume there are attached sundry maps and plates, to which attention is invited in this connection. The general map of the island of Cebu shows the geological conditions of that island as developed by the geological survey conducted by the able and enthusiastic engineer, Enrique Abella y Casariego, whose faithful labors and valuable works I have frequently had occasion to refer to with satisfaction. From this map it will be seen that the Danao coal fields are the farthest north of the coal fields of Cebu; next south of them and adjoining them are the Compostela fields, and these will be treated of in the next chapter.

In the years 1898 and 1899 the Danao and Compostela fields seem to have passed into the possession of Enrique Spitz, a merchant of Manila, who has attempted to add to the area of this territory by filings made in Cebu, and also in Manila, after the American occupation in 1898, with a view of consolidating these two coal fields and covering a large block of coal lands in one body, consisting of nearly 10,000 acres. Many of these claims are "third-class claims," the disposition of which, as to recognition, has not been determined officially under the Government of the United States. The large plate of this

ESPERANZA AND CARIDAD

Scale 1:1

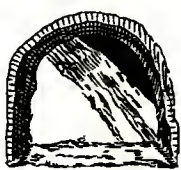
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1

FACES OF THE GALLERIES.



ESPERANZA



AUXILIARY



CARIDAD

GALLERY -

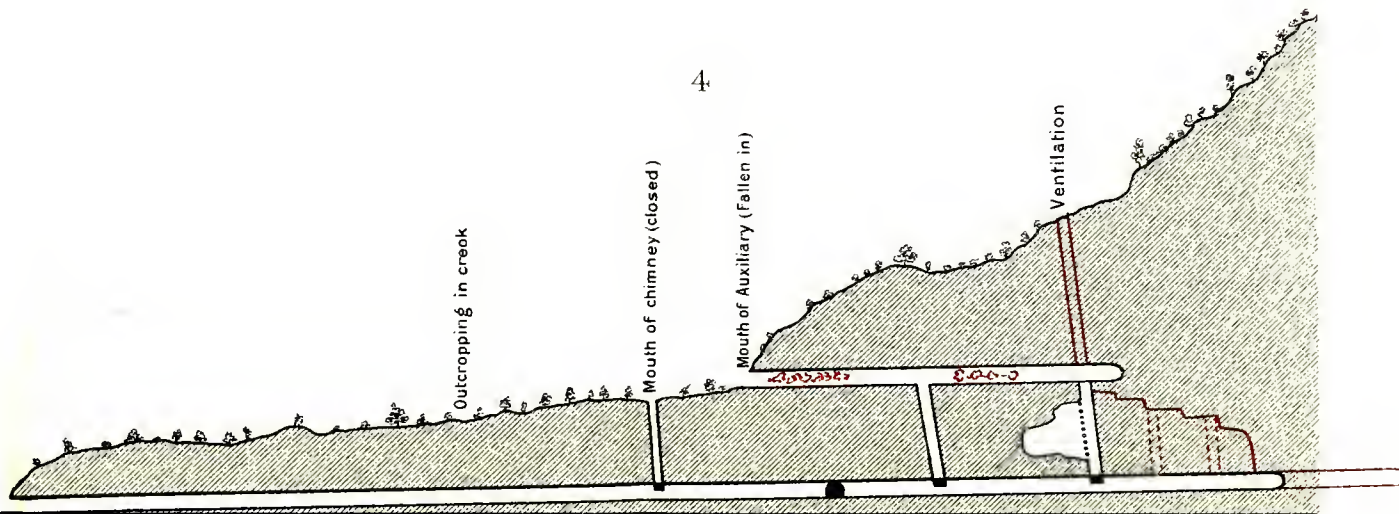


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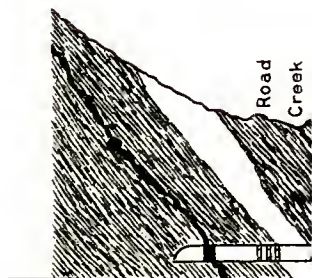


PROJECTION HOR

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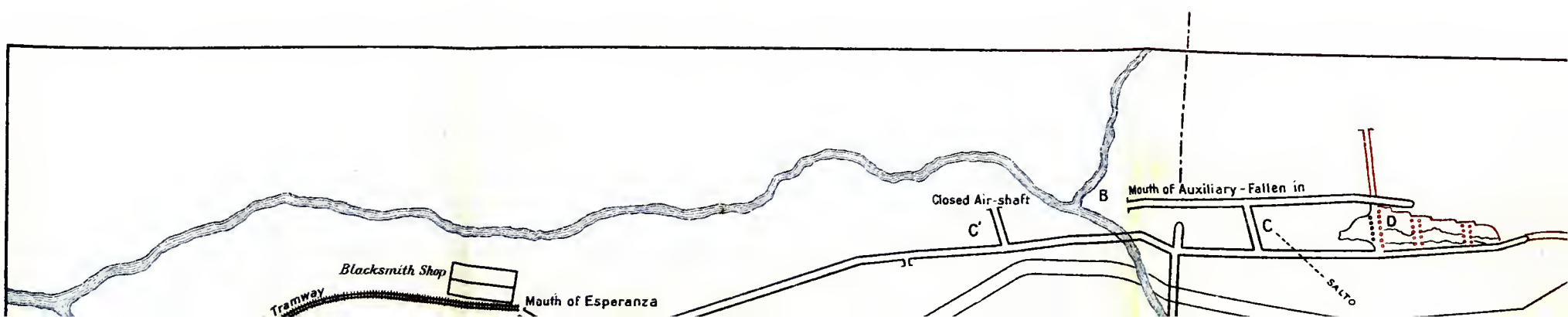


PROJECTION, ON A PLANE PARALLEL TO THE BED OF THE ESPERANZA GALLERY.



CUT-TRANSVERSA

GALLER



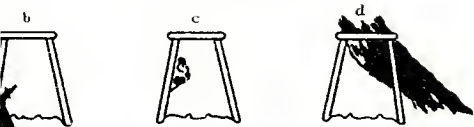
CARIDAD MINES, COMPOSTELA

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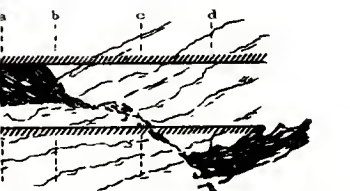


2

CARIDAD - ESPERANZA



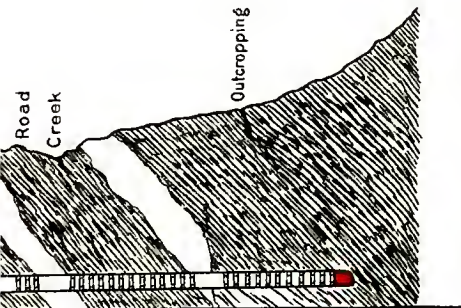
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HORIZONTAL OF THE GALLERY

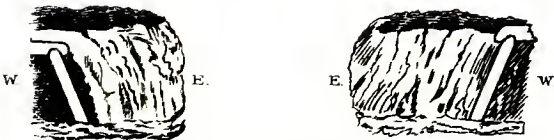
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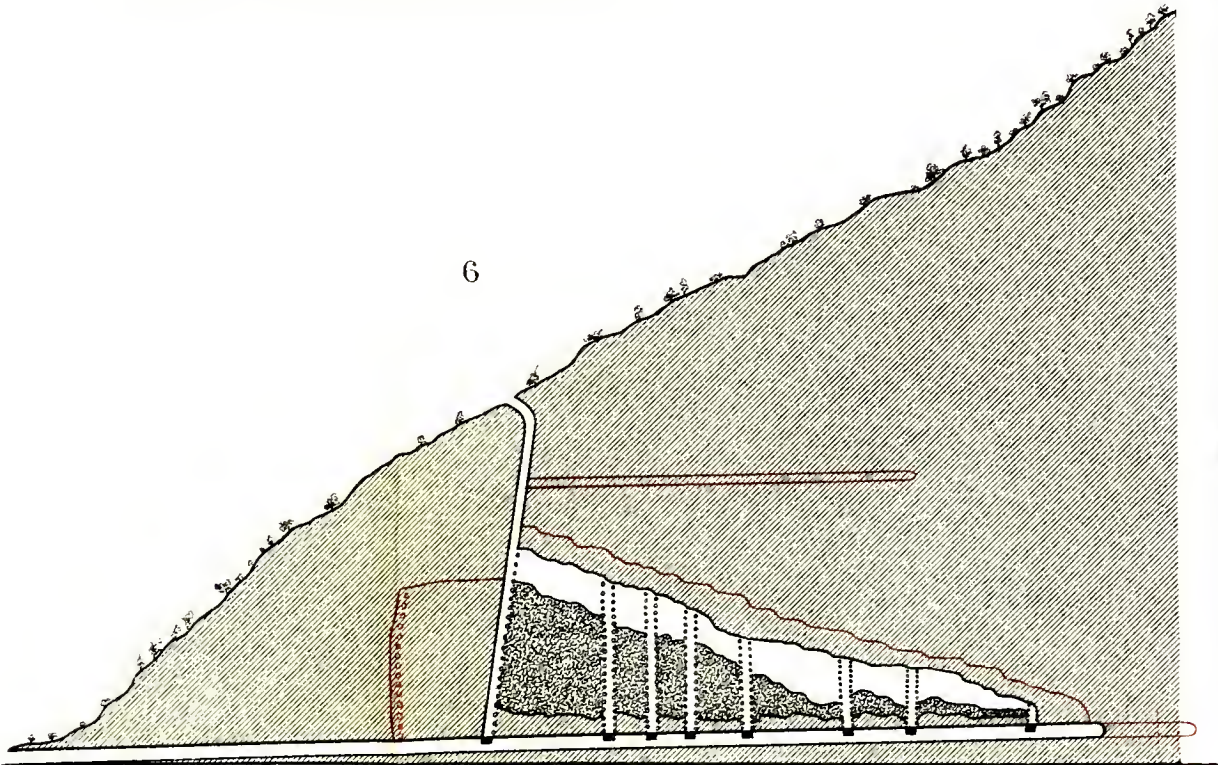
TRANSVERSE OF THE PASSAGE OF THE GALLERY ESPERANZA.

3

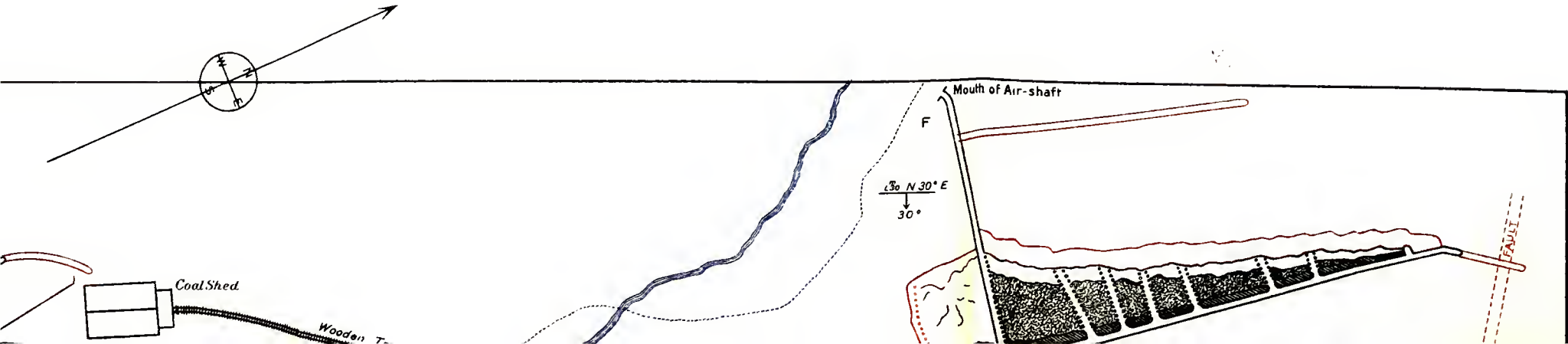


FACES OF THE PASSAGE OF THE ESPERANZA CUT WHERE APPEAR DISTURBED CONDITIONS OF SECOND BED.

6

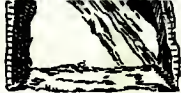


PROJECTION, ON A PLANE PARALLEL TO THE BED OF THE CARIDAD GALLERY.





ESPERANZA



AUXILIARY



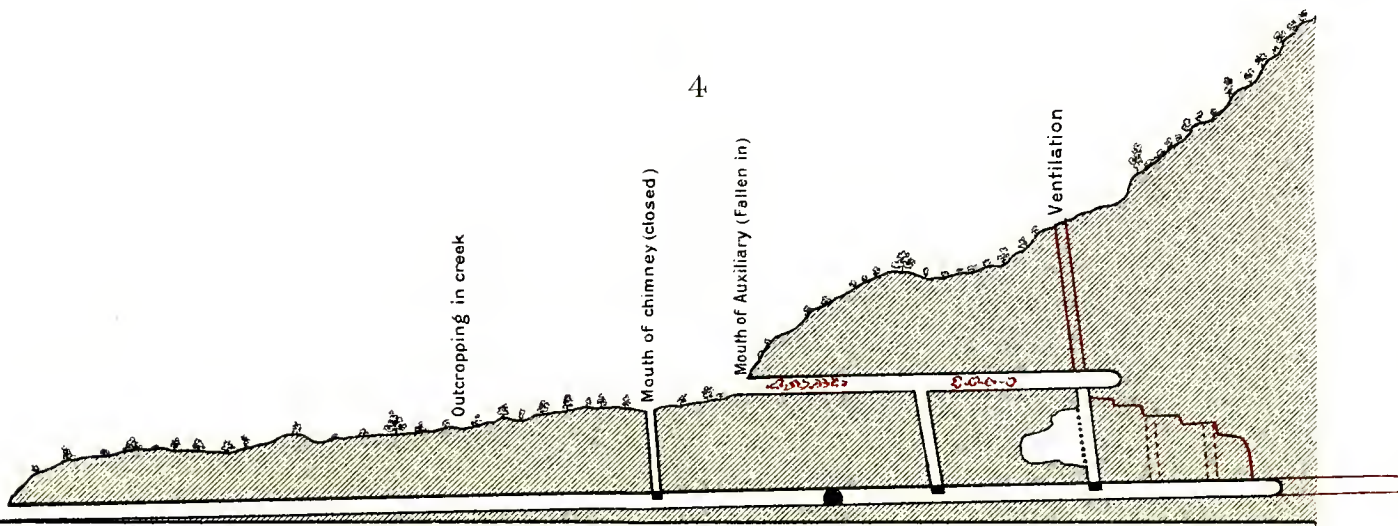
CARIDAD

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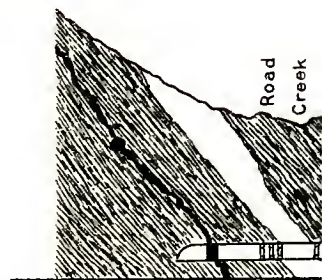


PROJECTION HORIZONTAL

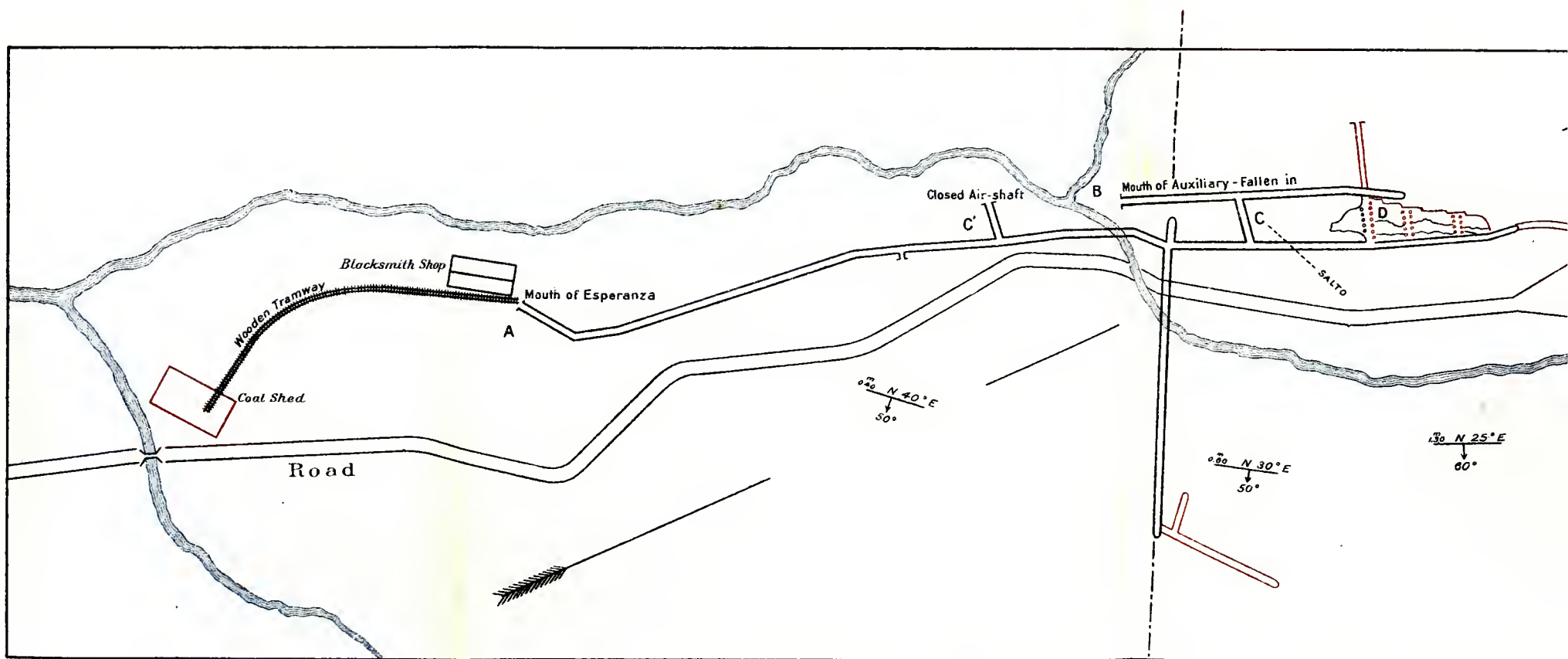
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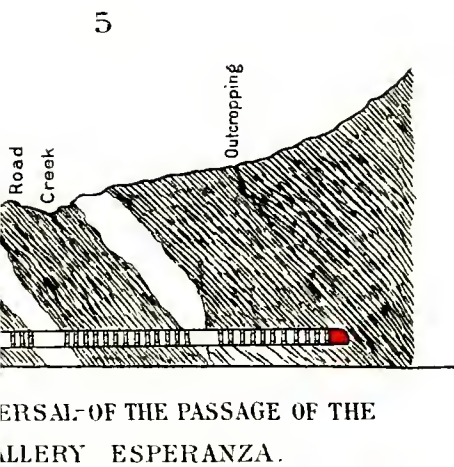
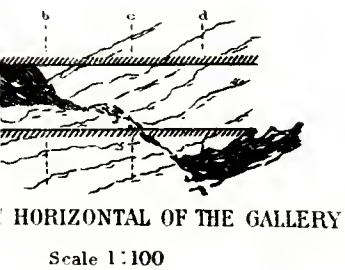
PROJECTION, ON A PLANE PARALLEL TO THE BED OF THE ESPERANZA GALLERY.



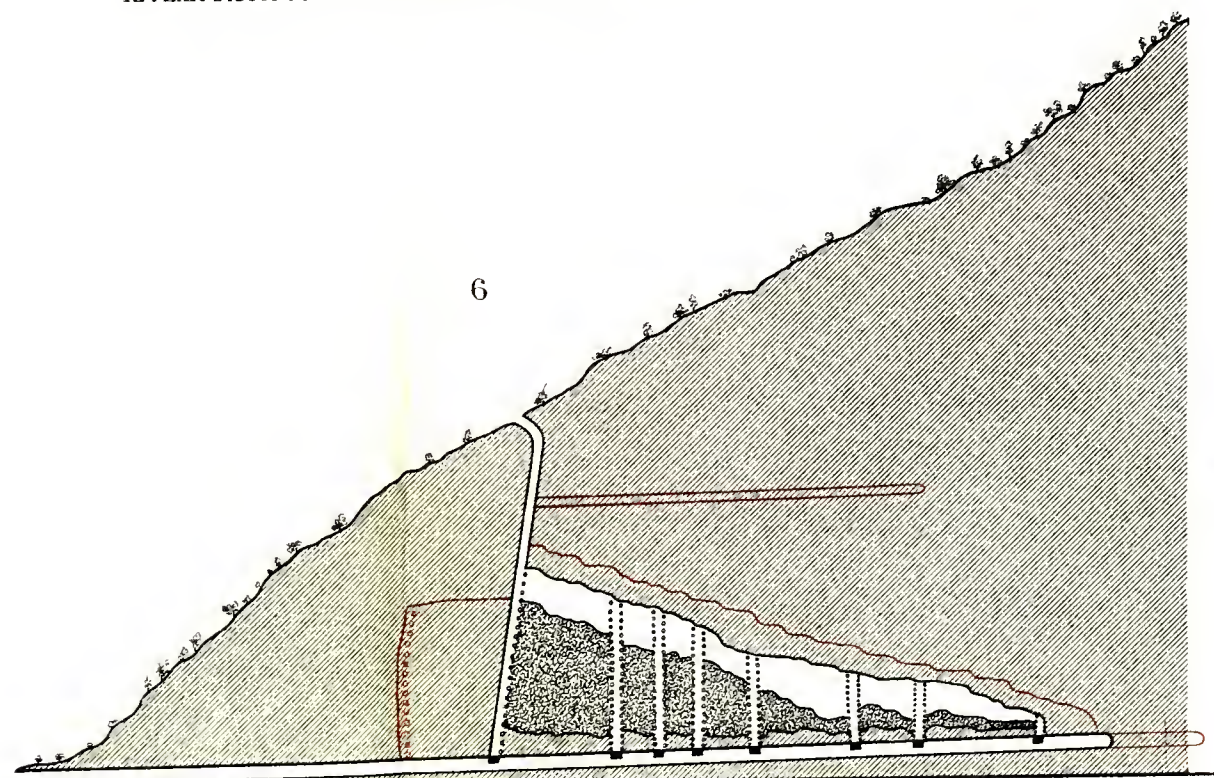
CUT-TRANSVERSAL GALLERY



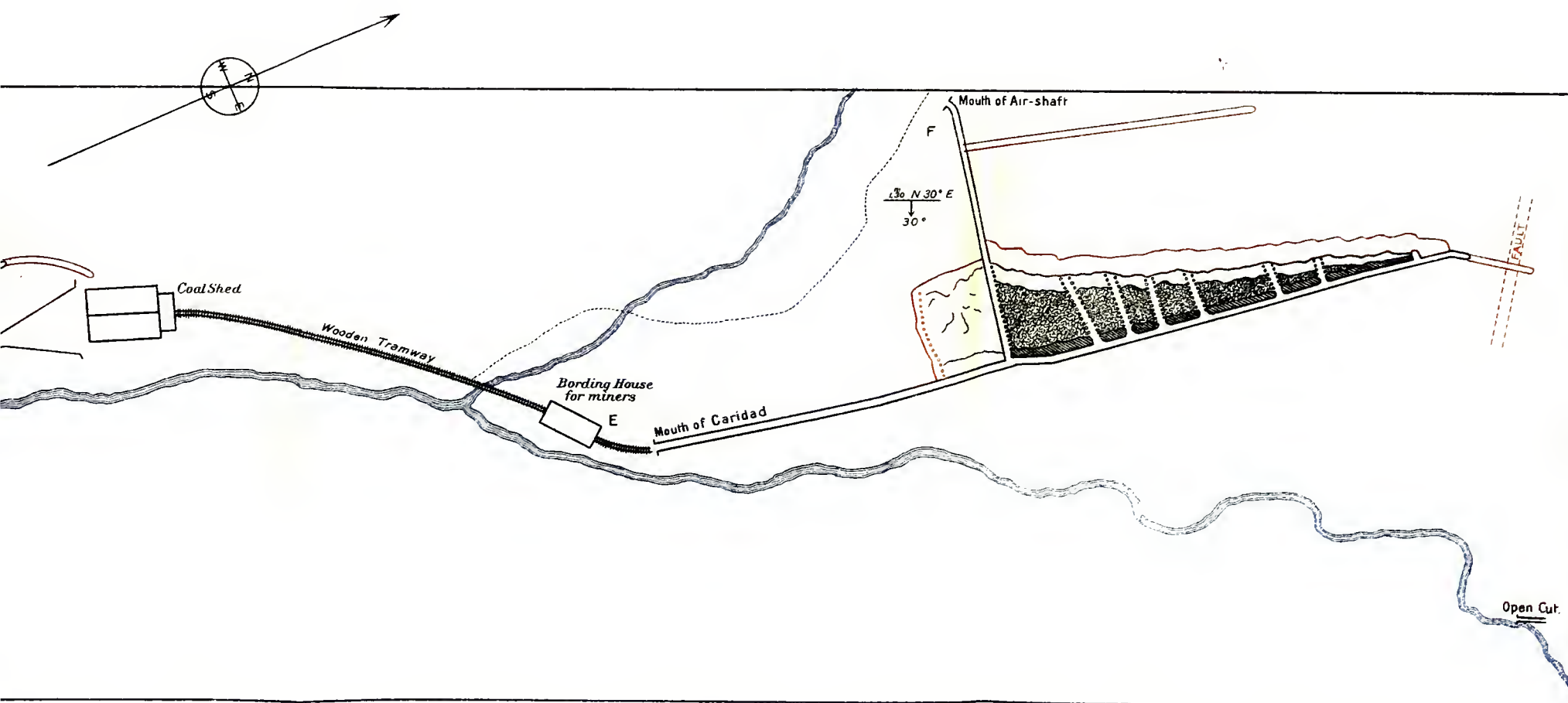
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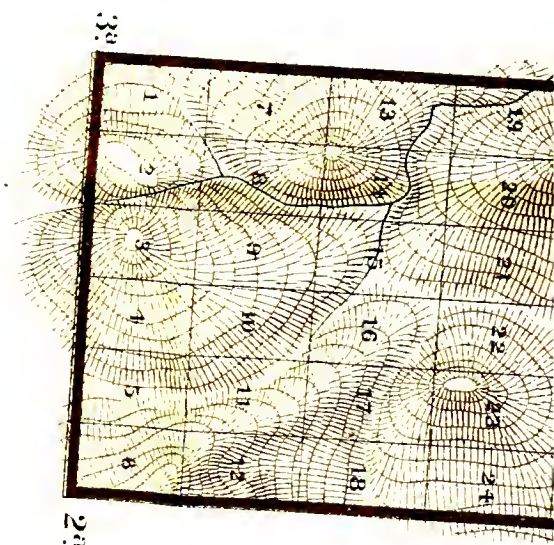


FACES OF THE PASSAGE OF THE ESPERANZA CUT WHERE
APPEAR DISTURBED CONDITIONS OF SECOND BED.



PROJECTION, ON A PLANE PARALLEL TO THE BED OF THE CARIDAD GALLERY.





DANAO - COMPOSTELA MINES

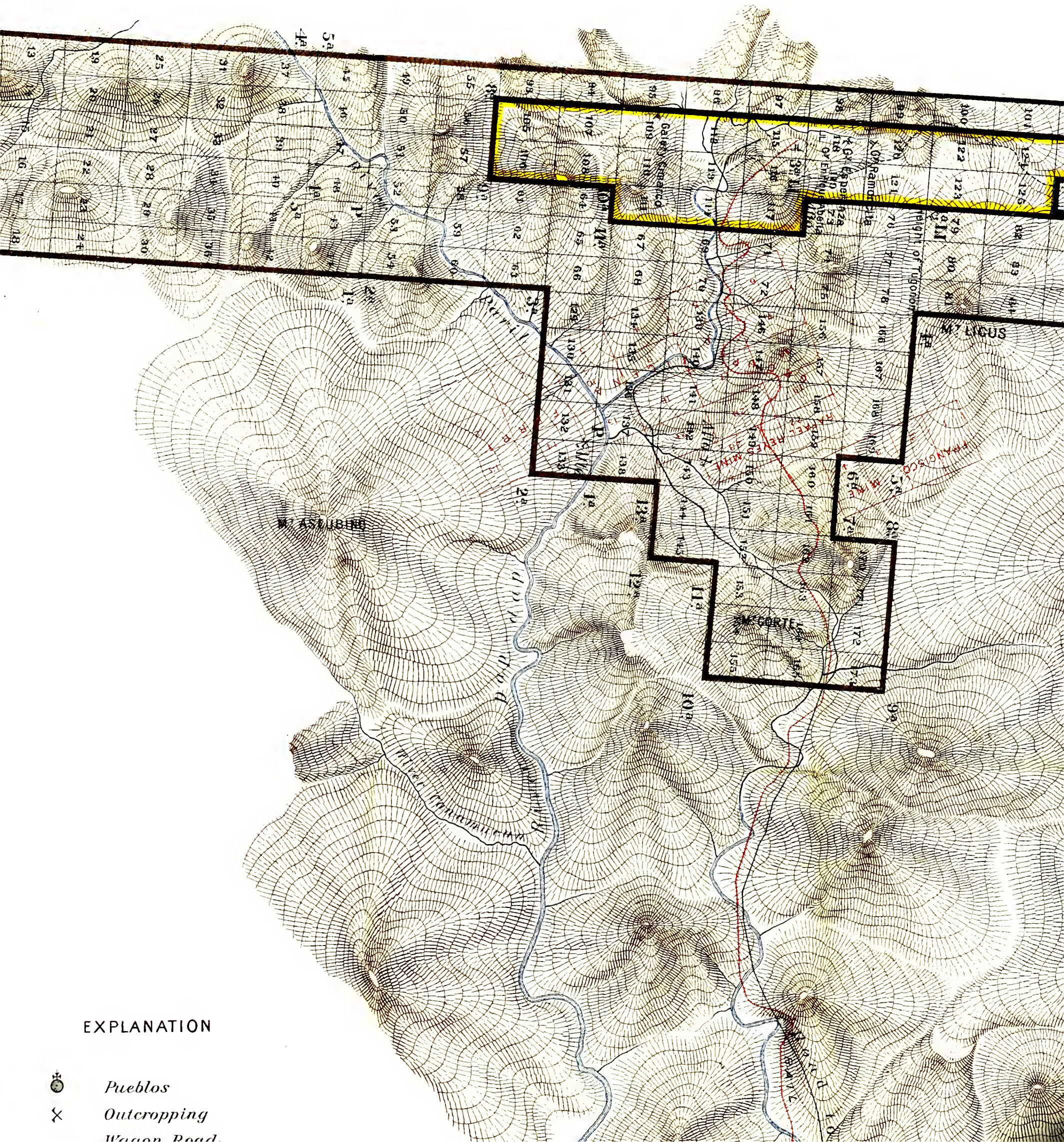
1899 - 1900

PERMISSION OF E. SPITZ

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EX





EXPLANATION



Pueblos



Outcropping

Wagon Road



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EXPLANATI

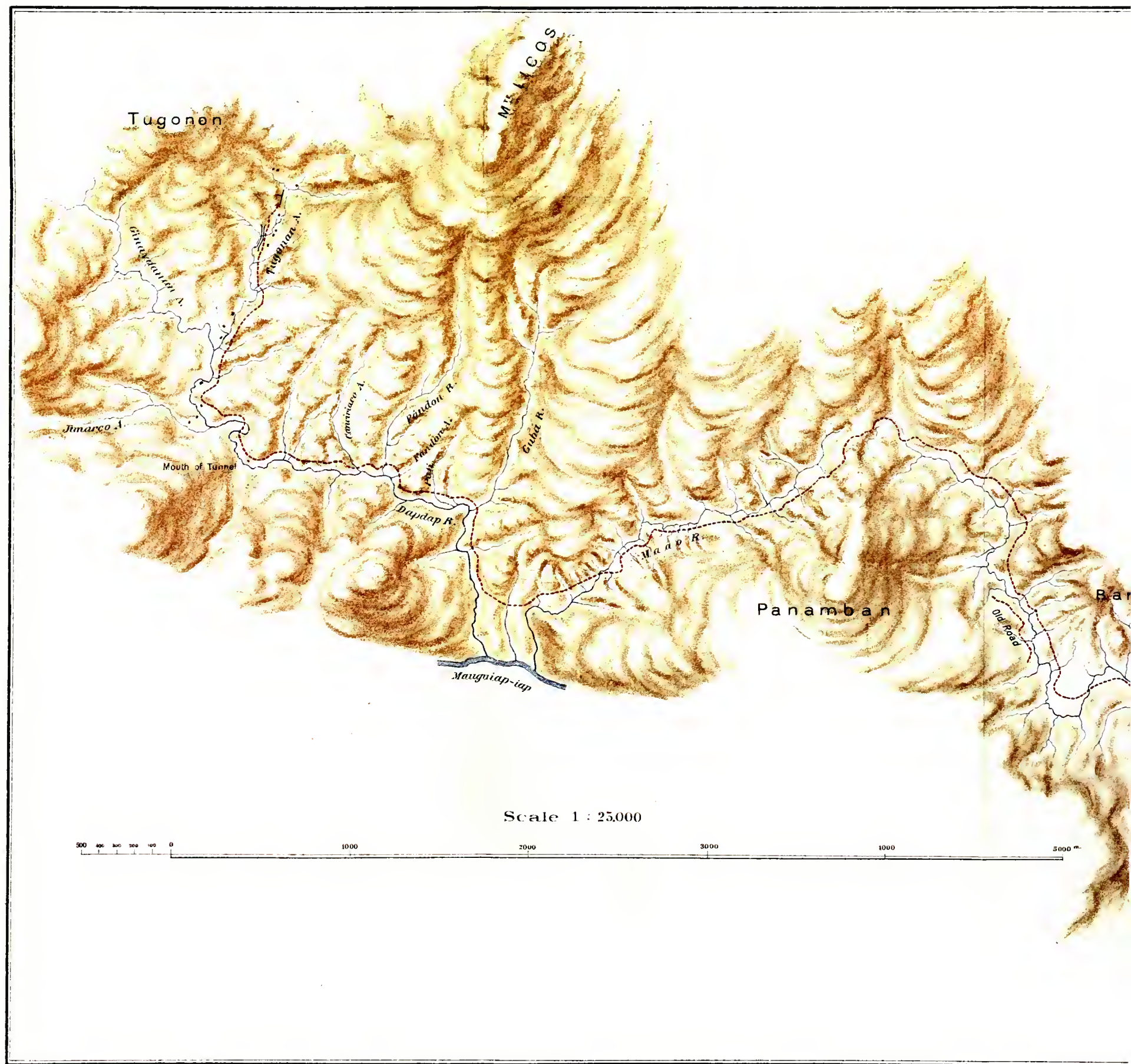
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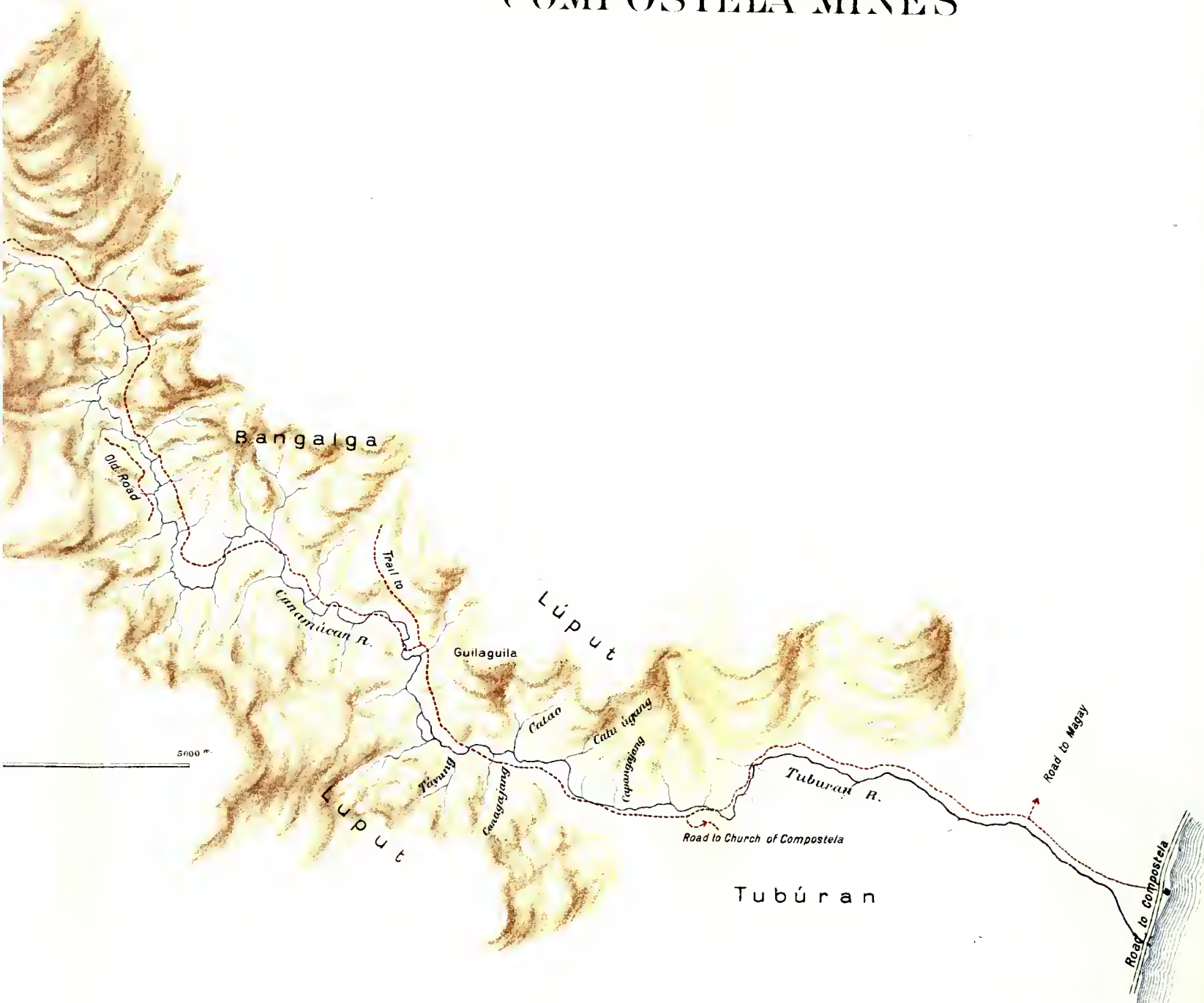
EXPLANATION

-  *Pueblos*
-  *Outcropping*
-  *Wagon Road*
-  *Bridle Path*
-  *Point of Departure*
-  *Legal Labors*
-  *Stakes of Demarcation*
-  *Magnetic North*
-  *Rail Road*
-  *Rivers*





ROUTE TO COMPOSTELA MINES



consolidated mineral group, with many details, shows the scope of this plan and the condition of these two fields with reference to each other. For this plate we are indebted to the courtesy of Mr. Spitz, who has been working these coal mines, and is working them up to the present date, to a limited extent and so far as the conditions of insurrection and disturbance in these islands would permit.

By reference to the table of mineral entries in Cebu the number, names, dates, and general conditions of all the subsequent entries of both Danao and Compostela can be found and their location can be traced upon the large map last referred to. They do not require any further explanation in this report.

CHAPTER XX.—THE COMPOSTELA MINES IN CEBU.

By reference to the table showing the coal entries of Compostela, in the closing period from 1887 down to the present date, two groups will be observed, and they are commonly spoken of as the "Angeles" and "Progreso" groups, respectively. The latter dates from the year 1887 and appears in the table under the name of the entryman, Juan Labridan. Three of these mines were renounced in 1888, and the "Progreso," of 20 pertenencias, was canceled in the year 1890.

The "Angeles" group dates from March 17, 1890, and the four mines composing the group were all entered by or in the name of Ramón Montañes, whose name is closely identified with the development of the coal mines of Cebu. This group consists of—

Date of entry.	Name of mine.	Number of claims.	Date of title.
		<i>Pertenencias.</i>	
Mar. 17, 1890	Angeles	12	May 16, 1891
Sept. 12, 1892	San Enrique	4	July 5, 1894
June 30, 1894	Rafael Reyes	2	Oct. 11, 1896
Apr. 4, 1896	Angeles	8	Mar. 23, 1898

Making a total of 26 pertenencias, or 3,900,000 square meters.

These mines have been frequently referred to in the last chapter, and will also be readily traced upon the large map of the Danao and Compostela coal fields therein mentioned. They adjoin the Danao mines on the south, and since the year 1898 we understand that the titles to these properties, which were never canceled by the Spanish Government and are consequently "first-class claims," have passed to Enrique Spitz as the representative of the Danao-Compostela Coal Mining Company.

The history of these mines, which, like the Danao mines, were connected with the coast by a railway of narrow gauge, also noted on the map, is told in the reports of the official visits of the engineers of the inspectorate, from which we take so much as may be necessary to

supplement and complete the information already referred to in the previous chapter:

VISIT OF MARCH, 1892.

The works which have been made upon the "Angeles" during the year, approximately, of its existence may be reduced to the following five:

A gallery of direction of 9.29 meters in length and of 1.80 by 1.60 meters in cross section, made upon the strata which has undergone combustion and toward the northeast, farther up than the point of commencement.

Leaving the said point of commencement and going in a direction from north to south, a second working of the said five is found, which consists of a gallery of some 8 meters in length, already abandoned and fallen in, by reason of its having encountered in its extremity the old workings, which are likewise destroyed.

Continuing to the south, there exists a third transversal gallery of 17.20 meters in length, established with very good judgment, inasmuch as in addition to cutting the strata of coal at a short distance, it is opened in more consistent and solid ground than that which is encountered in the fourth working, which is situated farther to the south and consists of a gallery of direction of 10 meters upon a stratum of 0.60 meter thick, and having for a foot wall and hanging wall clays exceedingly inconsistent and brittle, which made the advance of the works much more laborious and difficult.

Lastly, in the place farthest to the south and following down a small arroyo which has shown the diverse strata which have caused the former workings, there exists on its right bank a transversal gallery of 29.32 meters, with another of direction of some 14 meters to the right and left upon striking the stratum at some 20 meters from the mouth of the first.

Even while the works are directed and fortified properly, and leave nothing to be desired on this account as regards the regulations of an exploitation well ordered, I can not do less than indicate, before terminating my observations, that they have failed as regards article 50 of the law in force concerning mining, in not having supplied the number of workmen which it orders.

VISIT OF APRIL, 1893.

The workings of the mineral group "Angeles," in Compostela, are 11.25 meters, which the gallery "Santa Cecilia" measures, run transversally to a stratum of coal which has not been intersected as yet because of the paralyzation of the works. It runs through clayey slates, and the trapezoid which it forms for a cross section measures 2 meters in height and 1.50 meters in average width on the inside of its timbering.

Another of the workings—and which I will indicate in the order in which I have visited them—is the transversal gallery known by the name of "Ramoncita," of equal dimensions with the former and those which follow. It has not encountered the vein whose cropping appears in the arroyo near by in the 30.35 meters which have been opened.

Of the gallery denominated "Segunda," at present abandoned at some twenty odd meters, 20.48 meters are preserved in order to exploit an important bulk that was cut by this gallery transversally.

The "Aureliana" is a transversal gallery of 40.68 meters in length which has cut a vein whose direction is from S. 45° W. to N. 45° E., the inclination being from 35° to 40°. The rock which serves as walls is a clayey slate. Upon the vein there has been an advance of some 8 meters. At about 32.48 meters from the mouth of the "Aureliana" there is a chimney of inclination which is 10 meters in length, without yet having reached the surface.

Another of the workings is the gallery "Esperanza," of 96.46 meters in length, and made in coal from the very mouth upon a vein with a direction N. 10° E. to S. 10° W., the inclination being 35° to the E. 10° S., and its present thickness at the face measures 0.40 meters. At some 38.25 meters from the mouth of the "Esperanza" there opens a transversal gallery of 28.25 meters in length, intersecting at some 14.62 meters a vein of coal 1.20 meters thick and whose direction is from N. 28° E. to S. 28° W., and whose inclination is 30°, with a trend to the W. 28° N. Also at a distance of 28.90 meters from the mouth of the "Esperanza" there is a gallery chimney, auxiliary of ventilation, 36 meters in length, and following the inclination of the vein from where eight drifts, in vertical cuts of 2 meters of height, commence with an intermediate bulk between the gallery and the first of them, of 2.50 meters in width. The first of these drifts has advanced 27 meters, and the others at 2 meters from each other toward the mouth of the gallery.

The gallery named "Abella," 20.15 meters in length, is opened transversally upon an outcropping about to be intersected.

Near to an old gallery of the workings of Isaac Con-ui there is being opened a shaft 1.70 meters in length by 1 meter in width inside of its timbering and at present reaching 18.10 meters in depth. At a distance of 2.70 meters from its mouth it has intersected a vein of coal which is the same as that of the "Aureliana."

At 10 or 12 meters from the right bank of the arroyo Sugui there have been made 56.70 meters of transversal gallery, intersecting at a distance of 24 meters from its mouth a vein of coal of which it was impossible to take other data regarding the strata and the rest of the workings because of the cave-ins that have taken place.

Also on the right bank of the arroyo Jimarco there is a transversal gallery of 20.29 meters in length which intersects various veins.

It is a pity that certain works have not been carried along with others in order that the most favorable results might have been obtained, which is not the case, for while the works, essentially mining works, have been carried forward with sufficient activity, although not with the number of workmen required by law, the outside transportation has been disregarded, which has hindered them from attaining a greater development, and the group "Angeles" is found in a good state of exploitation, taking into account the inconveniences which it has had to contend with in preserving workings which are of no service whatever and the coal discovered in them which was not taken out at the proper time.

VISIT OF FEBRUARY, 1894.

The mouths of attack made upon this group since their concession are so numerous that, in order not to confuse them hereafter, it is desirable to cite all those at present known, indicating in passing their total advance and the corresponding computation of the workmen for the present year. They will be indicated, commencing from north to south, the length of all the pertenencias.

The first is the transversal gallery, named "Santa Cecilia," situated on the banks of the river Danao, and cited in the visit of 1893. Since then no workings in the nature of an advance appear to have been made upon this gallery, and to-day it is fallen in, and for that reason it was not possible to examine its interior.

On one of the small streams which unite to form the arroyo Sugui another transversal gallery, named "Ramoncita," is situated, which has been extended until it cuts an outcropping which is found farther up the same arroyo. In addition, lower down, but very near to the mouth of this same gallery, there appears another outcropping. This transversal to-day is 46.20 meters long, and therefore has advanced 15.85 meters in barren working, a small vein of 0.15 meter thickness having been cut at 40 meters from its mouth.

Following the arroyo there is encountered not far from this point the first work

cited in the visit of 1892, executed upon an outcropping of coal partly burned. To-day there is only to be seen a line of cavings-in of 10 or 12 meters in length, which prove an advance of 2 meters since 1892 in the gallery and the consequent exploitation of the upper part of the vein, which had not exceeded some 25 square meters.

In the portion of the arroyo nearest to the point of commencement of this group (old mouth of the gallery "Caridad") to-day there is scarcely to be seen the remains of the second working indicated in the visit of 1892.

Lower down on the left slope and in front of the present mouth of the gallery "Enrique Abella" there is yet found the remains, fallen in, of two workings, both of which bore the name of "Segunda," one of which is cited in the visit of 1893. In the state in which they are now found the total length reached by them can not be calculated.

It appears that one of them, or perhaps both, had for an object the cutting of the bed of 0.60 meter, which was directly attacked and partly exploited by means of a gallery of direction whose remains are to be seen farther down upon the same slope, and which were cited as the fourth place in the visit of 1892.

On the opposite slope and fronting the highest up of the fallen-in workings, called "Segunda," the gallery designated in the visit of 1893 by the name of "Aureliana" is encountered, which is to-day known by the name of "Enrique Abella." In this gallery there has been an advance over the 40.68 meters which it had in 1893 of 62.50 meters, always upon a vein of more than 1 meter in thickness. Besides this, within the present year there has been executed on it 90 meters of chimneys and narrow passages upon the coal and 187 square meters of exploitation.

In the gallery "Esperanza," situated at an upper level and opened upon another vein of less thickness, there has been advanced 25.84 meters in direction, in addition to the 96.46 meters designated at the former visit, amounting to the enormous quantity of 122.40 meters of chimneys and narrow passages in addition to the 36 meters which it already possessed on the last visit, which do not lend any service whatever and only tend to debilitate the vein and to multiply the timbering. Within this same gallery there exists, toward the east, a transversal, already cited in the former visit, upon which there have been advanced 4.20 meters.

On the other edge of the arroyo there was opened a transversal entitled "Abella," noted in the former visit, with 20.15 meters of length, which has advanced, according to information proved, some 11 meters more. In this latter course it encountered the vein of coal which it was intended to cut, but a falling-in having occurred, it was attempted to reach the same vein by another transversal situated upon the same side at a higher level, in whose mouth there exists yet a ground which indicates for this working a length approximately of some 15 meters. To-day it can not be penetrated by reason of having fallen in.

Below the mouth of the transversal "Abella," and very close to the arroyo and to the entrance of the old gallery called "Esperanza," opened by Isaac Con-ui, there still exists the mouth of a shaft which reached some 25 meters in depth, corresponding, therefore, to an advance of 7 meters for the computation of the present year, since on the former visit it was assigned a length of 18.10 meters.

Lower down from the mines on the arroyo called "Sugui" three mouths appear very close together, two of them situated on the left margin and the other, which is the highest, on the right.

This last was opened in a transversal, encountering the same vein reached in the gallery "Abella," and afterwards the transversal was continued and followed the vein for some 15 meters. It is difficult to measure the advance of this working, which is to-day fallen in, as in all those which are situated near to some arroyo, because their dumps are washed away by the current without leaving a vestige of the importance of the work executed.

At a higher level than this gallery, on the highest part of the slope, there exists

another transversal, to-day also fallen in, which should have reached some 40 meters in length. It is unknown whether it cut any vein of coal.

To the south of it are also seen the mouths, fallen in, of a gallery of direction and of a lower prospecting entry near by. The gallery must have reached some 12 meters in length, all in coal.

The other two mouths, which we cite heretofore, of the three near to the arroyo have the name of "Enriqueta." That of the north encountered loose ground, which caved in after reaching a length of 19 meters, according to the depression which can be measured upon the surface of the ground.

As a substitute for it there has been opened, lower down upon the same slope, another new "Enriqueta," also transversal, which at the present time reaches 13.50 meters in length.

Much lower down on the same arroyo, on its right bank, there has been opened another transversal, called "Albino," formerly known by the name of "Suqui." At a few meters from its entrance there has occurred a cave-in, which makes the inspection of its interior an impossibility. In the visit of 1893 it was assigned 56.70 meters for reference, because it then already presented another cave-in, which, after having been raised and continuing the transversal working and upon the vein, produced the present cave-in. In order to compute the working force, an advance of some 6 meters in the gallery of direction, on account of being the only ones proved, has been presumed.

Lastly, on the arroyo of Jimarco there has been opened another transversal with the object of cutting the vein of an outcropping which is to be seen in the bed of a small arroyo affluent. At the last visit it had already 20.30 meters, and it has advanced 5.50 meters more without as yet encountering the vein.

In résumé: The mine workings executed in the ten months past since the last visit are:

In transversals, direct measurements: "Ramoncita," 15.85 meters; "Esperanza," 4.20 meters; "Enriqueta," fallen in, 19 meters; "Enriqueta," at the present time, 13.50 meters; "Jimarco," 5.50 meters; total, 58.05 meters.

In transversals, presumed or calculated: "Abella," 11 meters; shaft, 7 meters; gallery fronting the "Enriqueta," fallen in, 30 meters; gallery above this upon the slope, 40 meters; gallery above the "Abella," 15 meters; total, 103 meters.

General total in transversals, 161.65 meters.

In galleries of direction, direct measurement: Upon the burned strata, 2 meters; "Enrique Abella," 62.50 meters; "Esperanza," 25.84 meters; total, 90.34 meters.

In galleries of direction, presumed or calculated: Gallery fronting the "Enriqueta," 15 meters; "Albino" (old Suqui), 6 meters; gallery with prospecting entry, 12 meters; total, 33 meters.

General total in galleries of direction, 123.34 meters.

Chimneys and narrow passages in coal: "Enrique Abella," 90 meters; "Esperanza," 122.40 meters; total, 212.40 meters.

Drifts of exploitation: In the "Enrique Abella," 187 square meters; in the burned vein (presumed), 25 square meters; total, 212 square meters.

With these workings the legal working force for the 20 pertenencias which compose the group has been covered, computing for that purpose the outer and auxiliary workings for screening, transportation, and other works within the boundaries of the pertenencias themselves.

The state of police of the interior workings appears to be excellent at first sight; the galleries are ample and the waters run well through the drains; the timbering is so profuse that the bents touch each other in many places, and the ventilation appears to be sufficient in the majority of the drifts and galleries; but all the details being examined with a little attention, some deficiencies are found. The timbering has not been put in place by experienced hands, since neither the joints of the

uprights with the crosspieces are well calculated for sustaining lateral pressures, nor are the arches placed firmly against the walls of the excavations, hollows resulting, from which there commences the falling of small pieces and hollow cavities, which upon propagation on the interior of the rocks produce enormous cave-ins, which are to be seen in these mines, and which contradict apparently the visible abundance of timbering. Neither is the ventilation at the front of galleries, which are not more distant than 25 meters, satisfactory, and it should be remedied by tubes, made either of lumber or thin plates of galvanized iron and from 30 to 40 centimeters in diameter, which overlap each other, placing them from the chimney of ventilation nearest to the face of the gallery in the workings in order to oblige the air to purify the gallery before going out through the chimney.

The scattering of the points for working proves in an evident manner that in this group there never has existed any plan of works, from which there results an excessive number of workings in barren ground and a disorder of the service very deplorable for the interests of the concessionary. On the other hand, the works preparatory for a true exploitation are very insufficient for a sustained production, which would be required by the iron tramway which is being installed from the mines to the coast.

VISIT OF FEBRUARY, 1895.

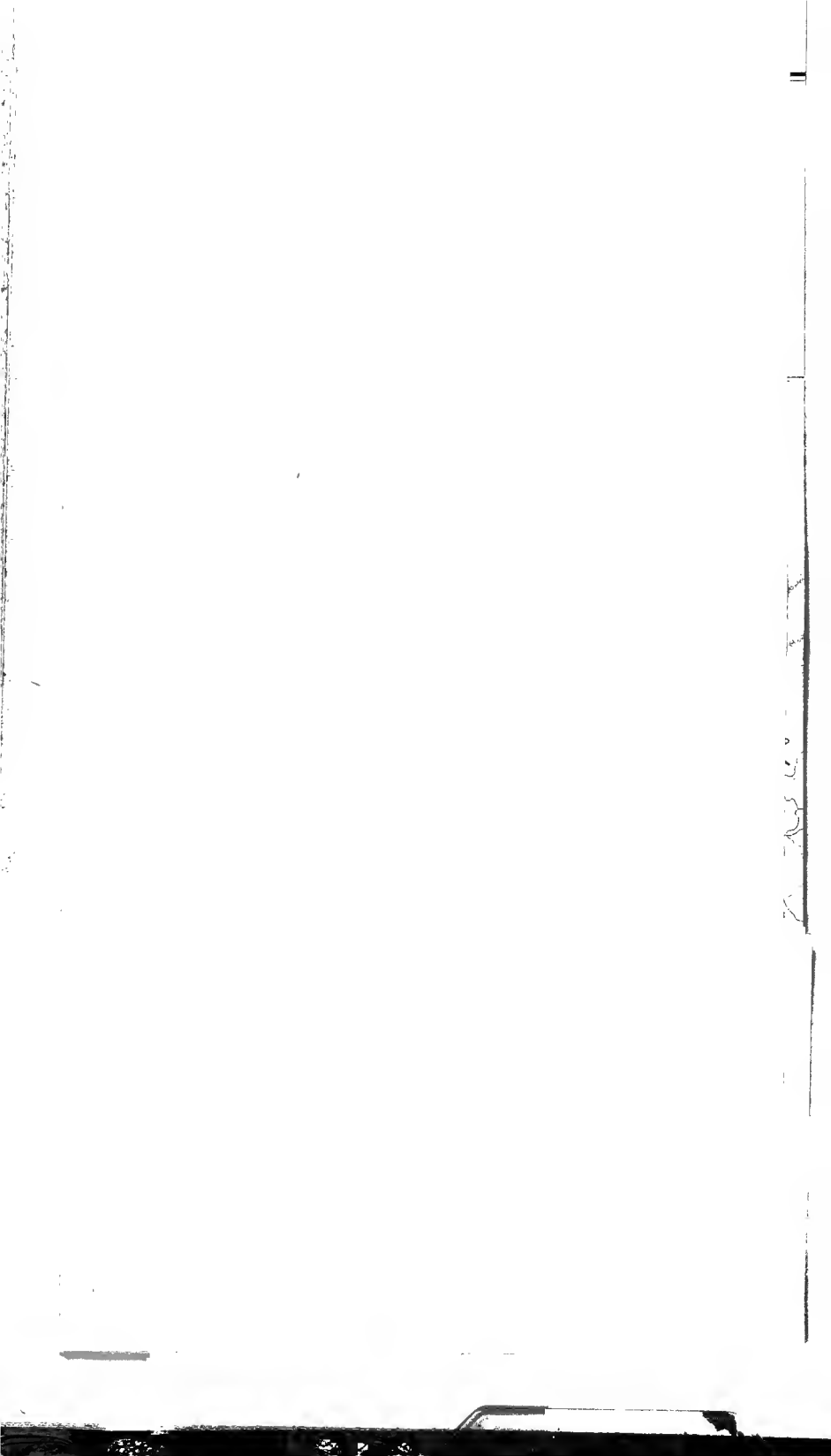
(NOTE.—The report of this visit contains an excessive amount of useless details, necessitating its abridgment; such portions as are quoted in full, as written, are printed in smaller type.)

The visit of this year was commenced with an inspection of the tramway in course of construction to connect the mines with the coast. The road was found to be projected for its entire length of 14 kilometers, with a width of 0.60 meter, and a weight of rails of 7 kilograms per linear meter. (See large map of Danao and Compostela coal fields.)

It commences with a dock constructed of lumber, 100 meters in length by 3.75 meters in width and 5 meters above high-water mark, terminating in a platform of 5.75 meters in width by 4 meters in length. On this platform is a double track. The track is constructed from the wharf for a distance of 7,300 meters to the foot of an inclined plane, which, when completed as projected, will have a length of 125 meters. The service on this plane is conducted at present by aerial steel cables of 0.005 meter in thickness, operated with block and tackle. Here the coal is reloaded. Leaving the plane upon the other side, the road is constructed to a distance of 1,800 meters to a coal bunker where service is now provided by a small steam engine of from 4 to 5 horsepower. From this point on to the mines, a distance of about 4½ kilometers, the service is by means of carabao carts and rafts over the old cart road.

The service of the transportation of the coal is effected, at present, in the following manner:

	Kilos.
1. From the mines to the bunker (engine) by carts and rafts.....	4. 500
2. From this to the plane by car	1. 800
3. Steel aerial cable	. 100
4. From cable to dock by car	7. 300
Total distance.....	13. 700



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The coal cars are rectangular in form, of 113 arrobas in capacity, or $1\frac{1}{2}$ English tons of 88 arrobas per ton.

The inclination or grade of the track in its course in descending, or from the mines to the dock, is from 1 to $1\frac{1}{2}$ per cent, and although in some portions it may be a little greater it never exceeds from $3\frac{1}{2}$ to 4 per cent.

This descent of the coal utilizes for its motive power only the grade of the track itself, and has a velocity of some three minutes per kilometer. The cars have their brakes corresponding to them, and each train consists in general of three cars.

The ascent is effected by trains of three cars, moved by animals (either carabaos or horses), and they have a velocity in the first place which averages very slow, and in the second some five minutes per kilometer.

This service, the road once being completed and the track in place, will be performed by a locomotive of some 4 tons.

This once being completed it will be possible to obtain a trip service exceedingly important, hauling up on the ascending trips the necessary material for the exploitation, and on the descending trip the coal to the dock, with the movement of some 10 trains daily of 5 cars to the train, or 50 cars of 113 arrobas each, which amounts to 5,650 arrobas; in tons, 75.

On this tramway there are several bridges of from 40 to 50 meters in length, and the work is well done.

The following workings were visited:

- I. "Jimarco."
- II. "Albino" (old Suqui).
- III. "Consolación" (new).
- IV. "Nueva Enriqueta."
- V. "Carmen" (new).
- VI. "Esperanza."
- VII. "Enrique Abella."
- VIII. "Buenavista."

I. "Jimarco" working: The timbering of this working has been renewed and strengthened.

The stratification of the clay beds have an average inclination of from 12° to 15° .

The coal is presented in the third zone, imbedded in a very hard sandstone formation eminently calcareous and with an inclination of 72° .

The lignite is highly anthracitic and metamorphosed, very dirty, but not pyritic.

The present working cuts a series of small veins of variable thicknesses, between 0.005 to 0.02 meter, which present a good appearance.

The contacts of these veins are of slate, bituminous in structure and foliated fracture, color whitish-black matte, and very adhesive to the coal.

The fracture of the coal is concoidal, with jet brilliancy.

The face is presented clean and with a tendency to change its stratification, presenting indications of slates analogous to those which were presented at the outcroppings.

II. "Albino" working: This working is fallen in and abandoned. Supposed advance, 23 meters.

III. "Consolación" working: This outcropping is found upon the river Suqui, at a distance of 5.91 meters from the center of the mouth of the gallery, whose course is E. $17^{\circ} 30'$ N.

This working is found fallen in completely. Señor Canga abandoned this working with reason, on account of finding them poorly directed with reference to the manner in which the veins present themselves.

The outcroppings, which are two in number, are distant from each other 2.50 meters, presenting two important veins with a direction of NNE. to SSW., with a

thickness of 2.50 meters for the first and 1.90 meters for the second and with an inclination of 13°. Supposed advance, 13.50 meters.

IV. "Nueva Enriqueta" working: This working, upon proving to be again necessary, it would be an indispensable necessity to run a chimney of direct draft at some 10 meters from the face.

It cuts no vein of coal whatever. Advance, 36.50 meters.

V. "Carmen" working: This working, by reason of being the first which has been really established by Mr. Canga, we noticed very particularly, finding it well timbered and secured; its advance changed in direction to avoid cave-ins, and the dimensions are more reduced.

The total working contains 11 meters in sandstone and 21.91 meters in clay.

It cuts some small minute veins of coal and tends to seek the vein marked by the new outcropping upon the arroyo Sugui.

The new outcropping has a direction, very marked, from north to south, and the lignite is very markedly anthracitic. From the middle point of this to the mouth of the gallery "Esperanza" there is a distance of 33 meters in a direction W. 10° N. Advance, 33.91 meters.

VI. "Esperanza" working: One of the most important of this exploitation.

There is established an iron track throughout its entire length, which extends to the exterior in a distance of 111.73 meters.

The timbering was renewed for the most part, and the old, which has not been lost, has been reenforced.

The ventilation is much better than on the former visit, by reason of the establishing of a new upper gallery, which carries the air directly to the face, and in addition there is noted the establishing of a mechanical ventilation by means of suction air pumps installed in this last chimney.

At 38.25 meters from the mouth of the gallery there has been established a new partition, which tends to avoid the filtrations of water coming from the old and abandoned works of Isaac Con-ui, which threatened a change of the plan of this working until the present control of the waters.

The following advances have been made in this working: In direction, 26.54 meters; in transversals, 3.30 meters; in drifts, four of 3.30 by 2.50, 33 meters; in upper gallery, 25 meters.

The thickness of the vein of coal diminishes toward the surface of the exterior level.

VII. "Enrique Abella" working: In this working there have been performed the following labors:

First. Establishing of the track, which is extended to the exterior in a length of 148.09 meters.

Second. Renewal of all the timbering, which was in a very bad state.

Third. Improvement of its ventilation, carrying it always toward the face by means of an upper gallery.

Fourth. Establishment of six new drifts of narrow passages.

Fifth. Refilling of the old drifts.

Sixth. Opening of a second level at 23 meters from the first, communicating with the working in drifts.

So that it gives: Advance in principal gallery of the first floor, 73.59 meters; new gallery, second floor, 7.30 meters; narrow passages, eight of 2.50 meters each, or 20 meters; an upper gallery, 70.09 meters; working in drifts, 6 by 4.50 by 3.75 meters, or 101.25 square meters.

(NOTE.—The work "Romancita" has suffered no alteration with respect to the visit in which advances are referred to, but its arches have been renewed in order to prepare them for a new advance, and there has been established a track for communication with the "Enrique Abella.")

Résumé: First. The number of workings have been diminished, but, on the other hand, and what should have been done from the very first, these all tend toward a fixed and determined plan, which is to cut all the known veins by a grand transversal, which, in the opinion of Mr. Canga, ought to have some 300 meters toward the right in the direction of the gallery "Esperanza" and some 600 meters to the left for examination of all the outcroppings and the establishment of galleries of direction when the vein encountered should warrant it, exploiting this by the method of labors most appropriate to its thickness and other conditions.

Second. The establishment of a track will facilitate considerably the exploitation.

Third. The ventilation is much better.

Fourth. The timbers are more rationally established.

Fifth. The dimensions of the works newly made are more rational.

Computation of working force: Development of workings; old "Alboin," 23 meters; "Consolación," 13.50 meters; "Jimarco," 23 meters; "Nueva Enriqueta," 36.50 meters; "Carmen," 33.91 meters; "Esperanza," 29.84 meters; "Enrique Abella," 80.89 meters; total, 240.64 meters. They have scantily reached the legal number of workmen.

VISIT OF MARCH, 1896.

The number of pertenencias of the "Ángeles" and of the mining concession "San Enrique," with the neighboring mine, and whose accumulation of workings has been conceded, is sixteen, calling for eleven thousand seven hundred and twelve days' labor per annum.

The road which connects the mines with the wharf of Compostela is already extended to within some 800 meters of the mine workings without any other transfer than that of the inclined plane, whose installation has not yet been finished. This service, as in the former visit, is furnished by means of cables.

The advance in the workings during the past year, since our former visit, is the following, going from the north toward the south:

First. "Ramoncita" working: This transversal gallery has been prolonged in a longitudinal direction 23.40 meters. At 52.60 meters from the mouth of the transversal a vein of coal 1.10 meters thick, of 60 degrees inclination, and in a direction N. 17° 30' E., was cut, upon which a gallery of direction was run, which measures at the present time a length of 23.07 meters, in which and at 4.50 meters a chimney of 5.60 meters in length by 0.80 by 0.80 meter in size was raised.

The status of the working, both in the timbering and ventilation, is good.

Second. "Enrique Abella" working: In this working an auxiliary gallery has been made which is some 21 meters higher than the general gallery, and following, the same as the general gallery, the direction of the vein, measuring at the present time a length of 89.16 meters, in which there has been established two workings in ascending drifts, the first of which measures a surface of 422.50 square meters and the second 105 square meters. This gallery carries the ventilation to the general gallery and to the drifts, descending by means of two shafts, the first 2 meters long and the second 4 meters. These drifts communicate with the surface by means of two inclined chimneys, the first of 18.50 meters and the second of 13.50 meters. The upper gallery of the general gallery of direction has advanced 52.50 meters; the general gallery has likewise advanced 31.34 meters. In this drifts commence from a narrow passage, and 517.30 square meters have been exploited. In narrow cuts there have been made 22 meters of longitudinal distance. Ventilation and timbering good.

Third. "Esperanza" working: The general gallery has advanced 3 meters; the upper gallery 65.50 meters.

In narrow cuts there has been made a linear working of 7.40 meters. The drifts represented a working of 1,434.16 square meters.

At 15 meters from its mouth, and at the left-hand side, a transversal gallery has been opened, which measures 26.90 meters; and another at the right-hand side, and at 57.50 meters from its mouth, which at this time measures 40.20 meters and which cut the vein "Enrique Abella" at 7.55 meters. The renewed timbering is of molave and its condition is good. The ventilation is complete, both in the galleries and in the drifts.

Fourth. "Jimarco" working: This transversal gallery has advanced 18.02 meters without yet cutting the vein which it is seeking. The last 8.50 meters are cut in a clay so hard that its advance is less than as if it were done in sandstone.

In order to ventilate this working, and at 46.81 meters from its mouth, an inclined chimney has been established, 21.93 meters long with a section of 1 meter and an inclination of 65 degrees, which reaches to the surface. Ventilation and timbering good.

Fifth. "San Enrique:" In front of the legal labor of the mine by this name a new transversal gallery has been installed, which already presents the vein of coal in its face and measures 9.40 meters of fortified open cut and 12.70 meters of gallery. Ventilation and timbering good.

The mine "San Rafael," belonging to the same registerer, presented no legal labor whatever, and no book of visits in order to enter these facts; therefore the undersigned engineer proposes to the general inspectorate a correction or fine in money that may be suitable.

VISIT OF JANUARY AND FEBRUARY, 1898.

The coto "Angeles" and the mine "San Enrique" has had conceded its accumulation of works, and has an extension of sixteen pertenencias, there belonging to it a working force equivalent to eleven thousand seven hundred and twelve days' labor per year, or in the two years which have elapsed without a visit, twenty-eight thousand four hundred and twenty-four days' work.

I. "Ramoncita" working: In this working there have been made the following advances:

In the gallery of direction, 3.93 meters; chimney which pierces the surface, 14.10 meters. In the transversal gallery, which continues in good condition as to timbering and ventilation, there has been no advance; not so as to the gallery of direction, which has fallen in; so also as to the chimney.

II. "Enrique Abella" working: Advances of this working in two years:

In the principal gallery.....	meters..	83.89
In the auxiliary gallery.....	do....	22.00
In the principal upper gallery.....	do....	83.89
In the auxiliary upper gallery.....	do....	61.25
In the narrow cuts at the principal gallery.....	do....	26.00
In narrow cuts at the auxiliary gallery.....	do....	16.00
In ventilation chimneys.....	do....	117.50
In drifts of coal.....	square meters..	4,745.25

All the coal comprehended between the two galleries and that which exists over the second, up to the surface, has been taken out.

The coal that remains between the last chimney and the fault is divided by overhead galleries and narrow passages into nine masses, as they have told us, since we have not been able to visit it because of the auxiliary galleries and chimneys having fallen in.

State of the workings: The principal gallery is well preserved and is prolonged for 15 meters beyond the fault; all the rest of the workings are fallen in.

III. "Esperanza" working: Advances in this working are:

In the general gallery.....	meters..	5.00
In its upper ventilation gallery.....	do....	77.00

In cuts from the general gallery	meters..	28.00
In the first transversal gallery	do....	6.10
In the second.....	do....	6.80
In drifts upon coal	square meters..	1,492.87

Advances in this working are presumed because of their sinking in, since the mouth of the general gallery has caved in, and it was not possible to penetrate into it.

These workings ought to be worked with safety lamps because of the inflammable gases existing.

IV. "Jimarco" working: Advances in this working, 3 meters in the general gallery. The vein of coal has not yet been cut, and the status of this working is good.

V. "San Enrique" working: In this working the vein of coal, which has a direction from N. 7° E. to S. 7° W., with an inclination of 80 degrees to the east, and a thickness of 0.85 meters, has been cut. Advances in this labor in a transversal gallery, 10.30 meters; in a new gallery of direction, 7 meters. The transversal gallery is well preserved and the gallery of direction is fallen in.

VI. "Second Nueva Enriqueta" working: At the lower level of the galleries up to the present time established and very near to the arroyo Sugui a new working has been opened, which bears the above name, with the object of tapping the "Enriqueta" vein. Direction of this gallery, N. 17° 30' E. Dimensions: Length, 60 meters; width at the bottom, 2 meters, and at the top, 1.30 meters; height, 2.20 meters.

In order to give ventilation to this gallery, a shaft is commenced in the shape of an open excavation, which at present reaches 8 meters in depth without having as yet penetrated the gallery.

The mouth of this new working is fallen in, and in the outer surface, following the direction of the gallery, there exists various sinkings of the earth, although its timbers are nearly all preserved.

The entrance to this gallery is at present made through a narrow defile which the caving has left free, its police and sanitation condition being therefore very deficient.

VII. Between the mouths of the "Enrique Abella" gallery and the second "New Enriqueta" there has been commenced the construction of a coke oven, of which there is only seen, up to the present time, the lateral walls and two chimneys of short draft, all of it of brick and masonry in common bond, whose system can not even be defined, because there exists neither floor, fireplace, nor archway. The dimensions of this furnace, in the form of a rectangular plane, are 1.75 meters long, 2.95 meters wide, and 2 meters high.

The chimneys are in two bodies. The first is a truncated rectangular pyramid and the second a rectangular right prism, with the following dimensions: Lower base of the trunk of the pyramid, 0.75 square meter; upper base of the trunk of the pyramid, 0.60 square meter; base of the right prism, 0.50 by 0.45 meter; total height of the chimney, 2.71 meters.

RÉSUMÉ.

Advance in galleries.....	meters..	208.02
Advance in shaft.....	do....	8.00
Advance in chimneys and narrow passages.....	do....	201.60
Advance in upper galleries	do....	423.74
Total linear advance	do....	841.36
Labor in drifts upon coal	square meters..	6,237.34

Which demonstrates that the legal working force belonging thereto, according to its superficial extension, has been covered.

Since the month of September last all these workings have been abandoned, except for a very short period of time, in which the attention given to their preservation was

very deficient, by reason of which the general state of the same can not be poorer nor more lamentable, with danger on account of further labors of reparation which must later on be commenced, this inexplicable abandonment being very censurable.

AN APPEAL FOR PROTECTION AND ITS RESULT.

The concessionary of these mines also appealed to the Government for protection, but in a very modest degree. On January 24, 1893, he prepared and presented a petition requesting "That in all bids and purchases of coal for the State the mineral coals from Cebu and from Australia be admitted indiscriminately and at the same price." The result of this application, which was forwarded to Madrid, accompanied by voluminous and carefully prepared records stating all the facts regarding the development of the coal mines of the Philippines and the character and quality of the coal, resulted in the royal order which was communicated through the director-general of civil administration at Manila on the 19th day of February, 1896, and which speaks for itself.

To the Most Excellent GOVERNOR-GENERAL OF THE PHILIPPINE ISLANDS.

MOST EXCELLENT SIR: Your excellency's official communication, No. 95, of the 20th of February, 1895, with which you remit the expediente instituted in order to determine whether or not, in the purchases and bids for coal for the use of the State in that archipelago, the coals from said islands should or should not be admitted at the same price and indiscriminately with the coals from Australia, has been received.

After seeing the reports of such corporations and governmental departments as have been consulted, after considering the desirability of acquiring Philippine coals, not at the same price as the coals from Australia, but fixed at a value therefor according to their caloric power, and in conformity with the essential portions of the report of the superior council of the mining district, His Majesty the King, and in his name the Queen Regent, has seen fit to make the following order:

First. That the terms set forth in the communication of Ramon Montañes, proprietor of certain mines in the district of Compostela, in the province of Cebu, for the admission of the coal from that locality indiscriminately and at the same price as Australian coals in the bids and purchases of coal for the State, at Manila, are not admissible;

Second. That the resolution adopted by that General Government in its decree of August 25, 1893, is acceptable; by which it is provided that preference be given to the admission of native coals in the departments of the State over the Australian coals, and in fixing its purchase price there shall be taken into account, not only the difference of their respective caloric powers, but also the facts demonstrated by laboratory tests in order to be able to properly appreciate the quality of the coal for the purposes for which it is to be applied; and

Third. That, without prejudice to what has been done by that Superior Government, it is in turn directed to adopt all manner of encouragement for the coal-mining industry of that archipelago.

CHAPTER XXI.—THE ISLAND OF BATAN.

The island of Batan is not a stranger to the reader. It figures in this report as early as 1842, when the governor of Albay, Velarde, was working its large open deposits and shipping its coals, and again

in 1847, when entries were made by Martin Varanda. In the fifties claims were filed on its beds, and when the famous coal-mining company, "La Paz," retired from business, after its ineffectual attempt to increase its capital stock and to secure financial assistance from the State, the entries of this company on the island of Batan, known as the "Esperanza," "Filipinas," and "Albay," which had reached the stage of title ready for issuance, were left in that incompleated state, and the expedientes remain to this day in the archives of the mining bureau.

All of these things will be found in previous pages, but it is with the present condition of coal and coal lands in Batan, and with the entries made thereon belonging to the last era of Spanish rule in the Philippines, that we have to do in this chapter.

The principal known deposits of this island, so far as previous and present locations and discoveries are concerned, are on the north and east coast, although, for that matter, it is almost literally true that the entire island of Batan is a mass of coal, and not only that, but a mass of coal of good quality; it furnishes a coal that makes an excellent quality of coke, a fact we have been able to establish by a test of a sample from that island made in our own laboratory.

By reference to the table for the last half of the period covered by this report it will be observed that locations of coal were made in the year 1893 on the island of Batan, and almost simultaneously by three different parties—the "Sodupe," by Gil Brothers, consisting of two pertenenencias, on the 20th of December; the "Balerna," "Urgera," and "Ganalda," of one pertenencia each, on the 21st of December of the same year, by Messrs. Villanueva & Co.; and the "San Francisco," of four pertenenencias, by Emilio Muñoz, on the 30th of December, 1893.

In the year 1894 there was added to the Gil Brothers group of mines the "Bilbao," of four pertenenencias; the "Lucas y Josefa," of one pertenencia, and the "Chifladura," also of one pertenencia; and to the properties of Messrs. Villanueva & Co., the "Perseverancia," of one pertenencia. In March, 1895, Gil Brothers presented petitions for the "Presentacion" and the "Olaveaga," of two pertenenencias each. All of the above-named mines were conceded, and titles issued by the Spanish Government in the latter part of the year 1895, which is all of the mines on the island of Batan of the "first class;" that is, those for which concessions had been issued by the Spanish Government prior to the American occupation. This makes twelve pertenenencias in the Gil Brothers group, and four each in those of Messrs. Villanueva & Co. and Emilio Muñoz.

At the time of the American occupation there was pending in the inspectorate of mines, and awaiting demarcation and survey, upon application for concessions, the "Vizcaya," of twenty-four pertenenencias; the "Elisa," of one; the "Juanito," of four, and the "Lydia," of two pertenenencias, and all in the interest of Gil Brothers. From

the records and archives of the department it would seem, however, that the "Juanito" is included within the limits of the "Vizcaya."

All other claims on the island of Batan, noted in the table, belong to the class known as "third-class claims," and require no further attention at this time.

Notwithstanding the fact that the island of Batan is so near to the city of Manila, as compared with the mining fields of Cebu, but very little work has been done, apparently, for the actual development and active working of its coal deposits during the days of Spanish occupation. Directly after the issuance of titles, in 1895, owners of coal mines in Batan were found applying to the Government for a suspension of the laws and regulations requiring them to maintain a fixed working population for the purpose of the development of their mines, by reason of their inability to secure a licensed superintendent, and afterwards by reason of the disturbances of the country, caused by insurrection.

The information available in reference to the workings on the island of Batan, in the mining bureau, is very meager. From a prospectus issued by the firm of Gil Brothers it is learned "that it would be impossible to give a complete idea of the number of veins of coal existing in these mines and other data referring to the same, all the pertenencias not having been explored."

This statement is confirmed by the reports that have reached us through miners and prospectors who have visited the island since the American occupation of that portion of the archipelago.

From the same prospectus we quote:

There are seven veins explored up to the present time; they are nearly parallel to each other, with an average thickness of 1 meter and an inclination of approximately 25°. The workings are: Gallery No 1, running in a direction of N. 20° W., transversely to the first vein, which is cut at 25 meters distance from the point of excavation. At this point a gallery following the vein has been opened, this gallery being worked for a distance of 23 meters in length. The transversal excavation continues, encountering the second vein nearly parallel to the first and 35 meters distant; this has been worked for 32 meters. And for vein No. 3 two galleries, Nos. 2 and 3, have been opened, situated at an elevation of 35 meters above No. 1, and both in a longitudinal sense, No. 2 being found at 10 meters elevation with a thickness of 1.10 meters and an inclination of 20° W. The other labors are prospects for investigation, and all of them promise a large quantity of coal.

The above brief statement is substantially all the information that is available in reference to the coal deposits of Batan, so far as their working by the present claimants is concerned, that we have been able to find. The island of Batan has only been recently visited, but from the several miners and engineers who have visited it I am inclined to believe that the workings so far executed are of but little importance, while the samples of coal that have been brought back from these trips and exhibited in this bureau show that the coal is of a superior charac-

ter, and confirms our previously conceived ideas of the extent and value of this coal deposit of Batan, gathered from studies of that neighborhood and the general distribution of coal in the southern portion of the island of Luzon and its adjacent islands.

In the next chapter will be found the result of assays made from outcroppings of coal made in the inspectorate of mines at Manila. The samples so assayed were from the "Bilbao" and "Vizcaya" claims, and taken from the surface; samples that we have seen taken from the workings are of much better quality. There is an established market for Batan coal.

It would seem that the firm of Gil Brothers have perfect confidence in the ability of the coal properties owned and controlled by them to furnish not only a sufficient quantity, but also a satisfactory quality of coal for the use of the Navy of the United States in this archipelago, for in the year 1899 a proposition was made to the then military governor to furnish such an amount of coal as should be required for the use of the Army and Navy of the United States in these islands at a price which should be named by the military governor himself, provided that they were furnished with protection to enable them to proceed with the work on the mineral development of their properties. From special reports that I have been able to gather from those who have visited the coal fields of Batan and investigated the conditions of the coal deposits in that island, I have every reason to believe that with a regular and systematized plan of development and with practical coal mining methods that this offer might easily have been made good. There seems to be no question about the abundance of coal, and nearly as little question in reference to its quality.

CHAPTER XXII.—ASSAYS AND COMPARISONS OF PHILIPPINE COALS.

The first assay of Philippine coal was made in Madrid, at the National School of Mines, in the year 1853, the samples employed for that purpose coming from the mines of Guila-Guila, in Cebu. At that time, and for many years thereafter, the only facilities for obtaining assays of coal were in Madrid, to which place the samples were sent by vessels doubling the Horn, and consequently we have but few assays in the early portion of the coal-mining history of these islands. At sundry points in this report will be found statements of assays made, and we propose to add in this chapter such other statements as we have been able to secure from the records and archives of the bureau and from all other sources. The assays, without exception, were made from surface samples and outcroppings, while in the tables that are mentioned, and in which are given statements of the assays of lignites and soft coals from all other parts of the world, the samples have come

from the best samples available, taken from the depth and average of the vein.

The assays previously stated in this report will be found for Guila-Guila coal on pages 31 and 71, for Uling and Alpaco coal on page 41, for the island of Negros (Calatrava) on page 103, for the island of Masbate on page 128, and for the island of Bulalacao on page 136.

To these we add the following:

ISLAND OF ALABAT.

Outcropping of coal from the Visita of Camogan (Camagung), island of Alabat, town of Gumaca, province of Tayabas:

Composition per hundred:

Hygroscopic water	3.20
Volatile matter	23.28
Carbon	68.04
Ashes	5.48
Total	100.00

The combustion is slow; the ashes are reddish-gray; it produces a coke of a brilliant metallic aspect. Total calories, 6,442.

ISLAND OF LEYTE.

A sample of coal sent to the general inspectorate from Merida, in the island of Leyte:

Composition per hundred:

Fixed carbon	47.975
Hygrometric water	.550
Volatile material	48.350
Ashes	3.125
Total	100.000

Specific gravity, 1.08; calories, 5,800.

ISLAND OF CEBU.

From various outcroppings on the property of the Sociedad Nuevo Langreo, in the district of Danao.

First sample from the place called Chile:

Composition per hundred:

Fixed carbon	41.90
Hygrometric water	24.45
Combustible volatile matter	23.44
Ashes	10.21
Total	100.00

Calories, 5,053 to 6,146; color of flame, whitish-red, giving little smoke; ashes a whitish-yellow; it does not coke.

Second sample from the same locality, taken from a parallel vein near by:

Composition per hundred:

Fixed carbon	48.250
Hygrometric water	18.162
Combustible volatile matter.....	24.238
Ashes	9.350
Total	100.000

Calories, 5,217; long white flame; little smoke; ashes white-yellowish, and it does not coke.

Third sample from the same neighborhood but farther south:

Composition per hundred:

Fixed carbon	45.660
Hygrometric water	22.388
Combustible volatile matter.....	27.632
Ashes	4.320
Total	100.000

Calories, 5,487; burns with a long white flame, giving off but little smoke; ashes are lead white in color, and it does not coke.

Fourth sample, from the place called Mantija:

Composition per hundred:

Fixed carbon	46.500
Hygrometric water	16.898
Combustible volatile matter.....	29.902
Ashes	6.700
Total	100.000

Calories, 5,680; burns with long white flame, giving off but little smoke; ashes reddish white; slight tendency to coke.

ISLAND OF BATAN.

Five samples of coal from outcroppings on the mines "Bilbao" and "Vizcaya," assayed for Jacinto Gil Gorroño.

Sample No. 1.

Composition per hundred:

Fixed carbon	45.53
Hygrometric water	13.10
Combustible volatile matter.....	34.15
Ashes	7.22
Total	100.00

Calories, 5,206; flame long and white; gives off a highly dense smoke with a slight resinous odor; ashes white in color, slightly yellowish.

Sample No. 2.

Composition per hundred:

Fixed carbon	46.82
Hygrometric water	13.84
Combustible volatile matter	35.46
Ashes	3.88
Total	100.00

Calories, 5,687; flame long with reddish-yellow cone; smoke dense and with the characteristic odor of pit coal; ashes yellow, with a somewhat leaden color.

Sample No. 3.

Composition per hundred:

Fixed carbon	44.78
Hygrometric water	13.32
Combustible volatile matter	38.68
Ashes	3.22
Total	100.00

Calories, 5,540; flame reddish yellow in color; slightly dense smoke, with a very resinous odor; ashes reddish-leaden color.

Sample No. 4.

Composition per hundred:

Fixed carbon	42.50
Hygrometric water	14.20
Combustible volatile matter	37.70
Ashes	5.60
Total	100.00

Calories, 5,536; flame is reddish white in color, and gives off a very dense smoke with a characteristic odor of pit coals; ashes white in color and slightly yellowish.

Sample No. 5.

Composition per hundred:

Fixed carbon	44.96
Hygrometric water	13.40
Combustible volatile matter	38.54
Ashes	3.10
Total	100.00

Calories, 5,513; flame reddish white, giving off a somewhat dense smoke of resinous odor: ashes a yellowish-lead color.

ISLAND OF CEBU.

Through the courtesy of Mr. Neil McLeod we are enabled to give an assay made from the Uling coals, of the river Pandan, in Cebu,

made by the mechanical department of the Southern Pacific Railroad, at San Francisco, Cal.

Moisture.....	6.30
Volatile matter	35.30
Fixed carbon	53.55
Ash	4.45
Sulphur	0.40
Total.....	100.00

Caloric value, 13.54; calorific value, with relation to Cardiff coal, 87.32; this coal does not coke.

THE COALS OF JAPAN.

In Table V (sheets A and B), attached hereto, will be found an analysis of the Japan coals that are so extensively used in the Orient. Of the coal classified in this table Nos. I, II, and III are from Kiuslin, and IV, V, VI, and VII from Yezo. Their analyses are taken from the work, *Yesso Coals*, by H. Munroe, Tokio, 1874. No. VIII is taken from Hawk's Narrative Perry Expedition. Of these coals of Japan, Professor Rein says, in his work on *The Industries of Japan*: "Japanese coal in most places, if not everywhere, is Tertiary coal, and its origin of lacustrine formation. Its recent formation is proved by the many leaf impressions of deciduous plants in the shales accompanying it, but its properties and appearance are like hard coal, and only in exceptional cases resembles those of brown coal. It is really bituminous coal, notwithstanding its lack of age, and with it are found seams of genuine brown coal in the Neo-Tertiary strata of Japan, although they are generally thin."

LIGNITE COALS OF WYOMING.

Through the courtesy of Prof. Wilbur C. Knight, of the University of Wyoming, we have obtained the latest assays from the lignite coal fields of that State, from which we have been able to compile the table of "Analysis of the Philippine coals, compared with Cardiff, Australian, and Wyoming coals," which will be found in Table VIII, hereto attached. (This same table is also found on page 50 of "Reports of the Taft Philippine Commission," S. Doc. No. 112, Fifty-sixth Congress, second session, having been previously used as an exhibit of a report to the honorable United States Philippine Commission from this Bureau.)

LIGNITES AND CANNEL COALS FROM OTHER PARTS.

In Tables VI and VII will be found analyses of various lignites and cannel coals, not only from the United States, but from various other countries, from an examination of which, when considered with refer-

ence to the Philippine coals, the analysis of which in every instance is from outcroppings and surface coals, it will be seen that there is no reason why the Philippine coals should not compete with both the Japanese and Australian products in the Far East as a steam-making coal, and it will undoubtedly do so when the mines are once developed and made to produce, as they undoubtedly will, a quality of coal far superior to any of the samples of Philippine coals that have yet been analyzed and reported upon.

Very much has been said in this report, from time to time, in quoting from different reports and documents found in the archives of this Bureau with reference to the age and character of the Philippine coals. We assume no responsibility for the accuracy of any of these statements, from the "black rocks that burn" opinion of a provincial alcalde, in 1842, on up to the scholarly descriptions of the governor-general's special engineer to the "La Paz." This is not a prospectus for the organization and floating of a mining corporation, but an attempt to compile from official records and reliable sources the facts in reference to coal and coal mining in the Philippines, so far as it is known, and the progress and history of its development. Of this question of the age and character of the Philippine coals, and the conclusions to be drawn from the evidence submitted, we have nothing to do. We quote, however, the remark of Mr. Hiram D. McCaskey, B. Sc., mining engineer of this department, from his report to the chief of this Bureau, which forms an appendix to the Bureau's annual report for the year 1901 to the United States military governor in the Philippines:

Neither the assumption that because a coal is from the Tertiary beds it is necessarily a lignite, nor that if it be a lignite it is a coal of unimportance, can long be accepted, nor can many other assumptions equally absurd.

CHAPTER XXIII.—THE M'LEOD COAL AND RAILWAY CONCESSION.

Attached to this report is the translation of the complete record of the above-named concession, forming Appendix A. These papers create a species of concession which is radically different in principle from those obtained under the ordinary procedure of the code of 1867, and it is, therefore, not classified with the mines generally in Tables I and II.

With the cancellation of the titles of the mines "Josefa" and "Casilda," at Uling, in the district of Naga, in 1874, the property of the Sociedad Nuevo Langreo, the mineral properties of the Pandan Valley, in Cebu, were withdrawn from the market and the mineral coals of that valley were sold at auction to the highest and best bidder, accompanied by special conditions for the construction of a railway to connect the mines with the coast. At this sale Mr. Neil McLeod, of

Manila, became the purchaser, the proceedings reaching a termination at about the time of the commencement of the Spanish-American war.

The value of the coals of Uling and Alpaco has been a frequent subject of mention, but in the voluminous expediente prepared under the supervision of Inspector Abella all of the evidence in reference to the deposits of the valley of the river Pandan has been so carefully collected and connectedly and perfectly stated that the subject of this chapter needs no additional comment from this Bureau. The reading of Appendix A makes the entire matter clear, and the papers speak for themselves.

APPENDIX A.

TRANSLATION OF DOCUMENTS REFERRING TO ULING AND LUTAC COAL CONCESSIONS IN THE ISLAND OF CEBU.

GENERAL INSPECTORATE OF MINES (PHILIPPINES), MINING.

Expediente proposing the suspension of the admission of the registrations and investigations of mining claims in the valley of the river Pandan, in the division of Naga, island of Cebu, with the object of preparing this mineral region for the benefit of the State and subsequent concession.

Commenced March 14, 1894.

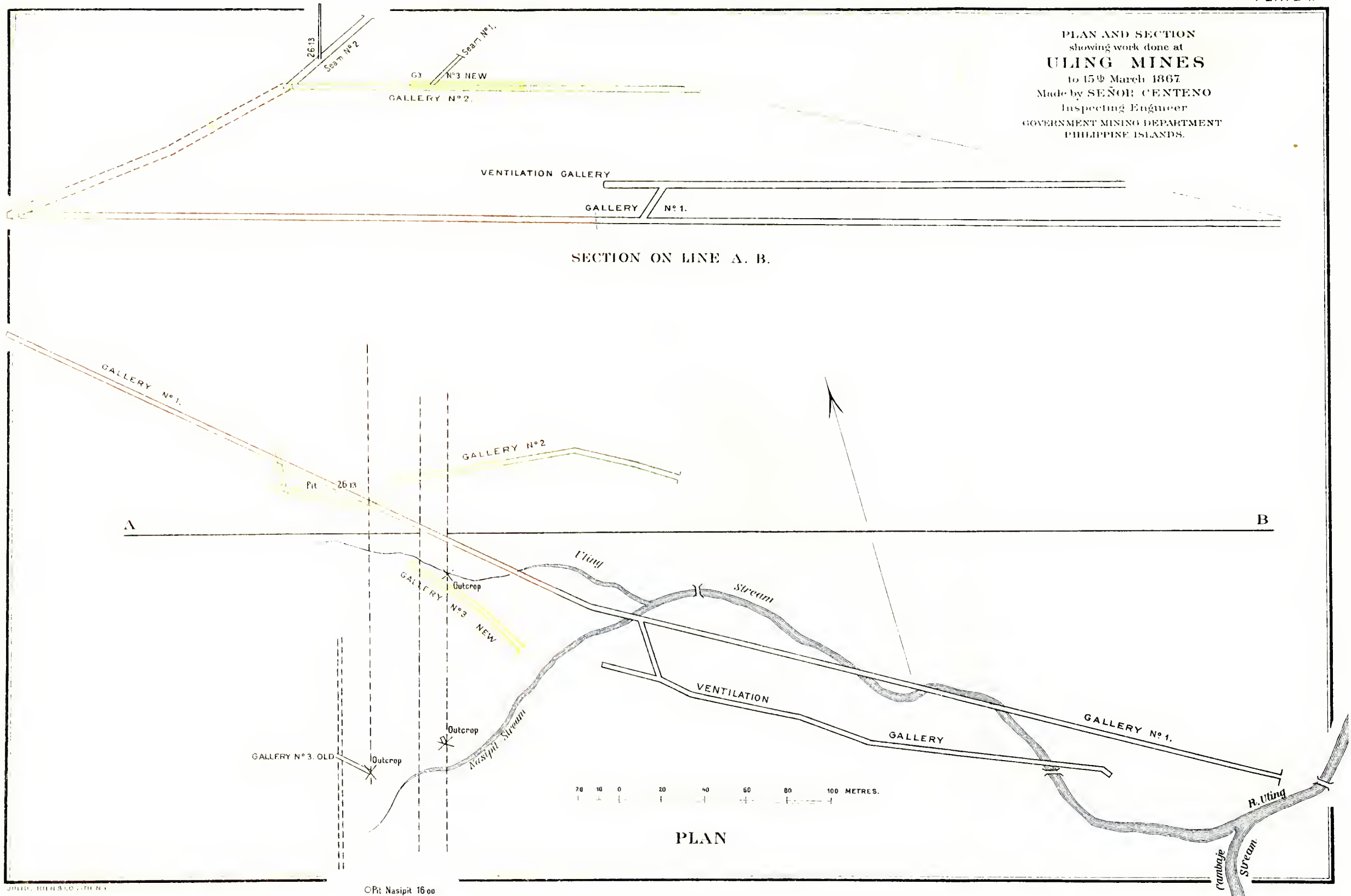
MOST EXCELLENT SIR: On submitting for your approval the decree of cancellation of the mines "Josefa y Casilda," of the group of Uling, this general inspectorate had the honor of indicating that it did not propose to declare open for registration the territory embraced in these claims, with the expectation that the most excellent governor-general would deem it proper to approve the proposal made regarding these deposits and the action to be taken by this general inspectorate.

The limited number of employees and the necessity of attending to business pending in this department in regular order obliges this inspectorate to restate this proposal in a few words, in order that, if it is deemed convenient, the decree of cancellation of the mines above mentioned and the matters proposed in this opinion be published together, without prejudice to a more complete statement being made in a more exhaustive treatise, to be sent to the minister of the colonies, containing the same arguments, supported by the facts which are scattered through various documents heretofore prepared by this general inspectorate.

Forty years have passed since the first attempts were made to develop coal mines in the island of Cebu and other places in this Archipelago, without there existing up to the present time a single mine with a production sufficient to demonstrate publicly and practically the gains that can be obtained in this business when properly conducted.

The causes which have produced this result do not depend upon the

PLAN AND SECTION
showing work done at
ULING MINES
to 15th March 1867
Made by SEÑOR CENTENO
Inspecting Engineer
GOVERNMENT MINING DEPARTMENT
PHILIPPINE ISLANDS.



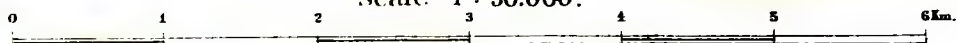
COAL FIELDS OF THE PANDAN NAGA, CEBU.

PLATE VIII



+Outcrops

Scale 1 : 50,000.



JULIUS BIEN & CO LITH N.Y.

poor quality of the combustibles nor upon the smallness of the deposits.

The inevitable experience in every new industry in its early stages, resulting in improper management, the exaggerated and enthusiastic ideas, the great amounts expended in roads and improvements not connected with mining, but necessary to its development and to the transportation of its products, exhausted the resources of the first to attempt such development, their exaggerated and enthusiastic ideas then turning into dismay and unjustified abandonments, which produced the discredit of a business of such great importance to the country.

Of late years, although the investigations made by the State have brought about the establishment of some small developments, the want of confidence of capitalists is still preserved to such an extent that those small establishments have been unable to secure the necessary funds with which to undertake the construction of roads for transportation which are necessary for the development of their mines.

At present those establishments are obliged to transport their coal in carts drawn by carabaos at a cost of from \$3 to \$5 per ton for transportation alone, which expense can not be borne and will again bring about the ruin of these enterprises, thereby further discrediting the coal-mining industry and retarding for thirty or forty years more the definite establishment of this industry in the Philippines.

Without doubt, most excellent sir, the establishment and development of this industry not only affects the wealth of these islands, but their defense, since the defense of an Archipelago must necessarily be made by the navy; and such defense of territories so distant from the mother country can only be assured by the development of coal mines within that same territory.

Therefore, it is the sacred and essential duty of the State to implant in a definite and permanent manner the coal-mining industry of these islands, as no one is ignorant of the fact that that industry can not be established in a few days nor in a few months.

The development by the State of one of the coal-mining districts of the Philippines, made with the object of, while providing for the exigencies of a war, serving as an example and model to other establishments which might be set on foot, has certain great inconveniences and disadvantages known to all, although some persons (but not the undersigned) defend the idea when applied to infant industries such as those of this archipelago, which idea has been carried out to a certain extent in the creation of agricultural experimental stations.

But, putting aside this development by the State, improper in its very nature, the State can and should attempt to give an indirect aid to the coal-mining industry, manifested by an indirect subvention to be paid back in a short space of time, which, avoiding the dangers and

difficulties which have destroyed coal-mining enterprises in the Philippines up to the present time, would make possible the profitable, permanent, and active development of a district previously selected, thereby furnishing an example which would assure the exploitation and immediate development of all other deposits of coal known at the present time and be the cause of the discovery of other new deposits.

The shoals on which have been wrecked these attempted coal-mining developments consist, as we have just shown, in the scarcity of the capital necessary to properly prepare an extensive district for development; and therefore, if this preparation is made by the State without actual exploitation of any kind and the mines are delivered under sufficient guarantee, after being so prepared, to a national company which can undertake the work, securing and selling coal, the profits which they shall obtain in the business must be more than sufficient to pay for the labor performed and the capital invested by the company and to repay in a short time the capital used by the State. In this manner would be practically demonstrated the possibilities of coal mining and the benefits to be derived therefrom, and it can not be doubted that with this example these enterprises will continue to be established and multiply.

It is clear that this preparation by the State, requiring the use of large capital, can not and should not be made except in one of the districts investigated by the State, where an outcome is assured which will warrant the realization of the plan of being paid back its advances, and of promoting and establishing the coal-mining industry; and for this none is so appropriate as the valley of the river Pandan, in which are situated the deposits of Uling and Lutac, which, in addition to containing various veins of a common thickness from 0.70 to 1 meter of merchantable coal, contains also another of 5 meters in width, already uncovered for more than 200 meters in depth, following its slope, in which assuredly there can and should be supposed to exist some 400,000 tons of coal above the level of the valleys. The selection of this district is justified, moreover, by the difficulties existing there for preparatory work, which demand the employment of forces and capital greater than other deposits of coal known in the Philippines, as is especially shown by the fact that, in spite of having belonged three years to the mining company "Nueva Langreo," the concessions had to be canceled because the company during these three years had not been able to secure a single ton of coal or furnish the force of laborers required by law for its claims, while in the mines of Danao, conceded to the same company, it has been able to comply with these requisites, although in a small way and under the difficulties above mentioned.

Therefore, most excellent sir, this general inspectorate has taken advantage of the time when this cancellation has been decreed in order to draw up the proposition which it now has the honor to unfold

before your excellency, likewise taking into consideration that the present state of the coal markets of these islands favors the attempt to develop extensively its combustible minerals, as the consumers, being accustomed to Australian coal, which now is very scarce in the market, which is substituted by coal of Japan and Borneo of a very inferior quality, desire to secure for their consumption Filipino coal, whose good qualities they are acquainted with.

In order to carry out the preparation of the Uling mines on behalf of the State, which are situated in the valley of the river Pandan, there are necessary—

First. The prosecution of investigations and necessary preparations in order that the company, which is the concessionaire, can commence its work with a production of from 25,000 to 30,000 tons of combustible material annually; and,

Second. The construction at the same time of a narrow-gauge railroad from Uling to the port of Tinnan, with the necessary docks for the transportation and loading of those 25,000 to 30,000 tons of coal annually.

To carry out these mining investigations, and for the proper preparation of the veins considered suitable for commencing the development, there will be required two years and a total capital of from \$30,000 to \$40,000; and for the construction of the railroad, which will have to be approximately 15 kilometers in length, will be required some \$75,000 to \$90,000, estimating a maximum cost, perhaps exaggerated, of from \$5,000 to \$6,000 per kilometer.

These figures, given in round numbers, will have to be made more definite by careful and detailed investigations, to be carried out by this inspectorate, concerning the mining labors, and by the inspectorate of public works concerning the railroad and dock; but an approximate estimate of the entire capital can be made at from \$115,000 to \$140,000, which has to be advanced by the State in the two years required for the completion of the preparatory labors proposed.

Considering the actual conditions and local facts existing, and the prices at which the combustible can be sold in the markets of these islands, it can be estimated that in the subsequent development to be carried out by the concessionary at least a net profit of from \$3 to \$4 per ton should be obtained, so that a tax can well be demanded from this enterprise of from \$1.50 to \$2 per ton to be applied upon the liquidation of the capital of from \$115,000 to \$140,000 advanced by the state, which would amount annually to from \$37,000 to \$60,000, to be applied on said indebtedness, if the enterprise should be required to produce a minimum amount of from 25,000 to 30,000 tons. In this manner the total liquidation of advances made by the State would be realized in the three or four first years of the exploitation, leaving besides to the enterprise a very respectable profit as interest upon the

capital employed in this development. Upon the settlement of the indebtedness, the road and improvements made by the State would pass to the company, but it should be obliged to then undertake prospecting investigations below the level of the valleys, in order to assure the total exploitation of the deposits.

The concession of these mines prepared by the State for profitable development can not be made under ordinary conditions provided by the mining laws, in which the State only concedes the right to work the deposits, but must be made to a special company, which must present guaranties that the work can be carried on so as to realize good results for itself, those of the State, and the towns; and therefore there can be demanded, among other conditions that may be considered proper—

That of citizenship of the individuals and the capital.

That of a minimum capital of \$80,000 with which can be prosecuted the work of developing the mines.

That of competent management, as is demanded by the law in force in these islands regarding coal mines, with a mining engineer having a diploma and being a Spanish subject.

That of producing a minimum amount of from 25,000 to 30,000 tons annually.

That of paying in a convenient manner the tax per ton for the settlement of the cost of improvements made by the State.

That of carrying on prospecting investigations beneath the surface as soon as the settlement is made of the advances of the State.

Besides, as the State should not perform any work in preparation without being assured that at its conclusion there would exist a company or partnership disposed to carry out the development and subsequent labor, the concession of the mine should be made previous to the commencement of the labors, but after executing the careful investigation regarding the mines, the railroad, and the necessary docks, since those studies are necessary to establish the cost which will serve as a basis for the concession. In this conception it will be necessary to demand of the concessionary the deposit of a certain amount in proportion with the amount of capital which the enterprise must have, from \$10,000 to \$12,000, which can be recovered in proportion as mining labors are performed in investigation and preparation; and which would answer for the existence of the company during the time in which the State is executing the said preparatory labors, avoiding the remotest probability that, upon the conclusion of these labors, the company will have ceased to exist.

In determining what class of funds will have to be employed for the object proposed in this statement this inspectorate does not believe that it can or ought to specify it. It should be shown, nevertheless, as a precedent which perhaps should be taken note of, that the carrying

out of public works and other similar services appearing in the local estimates, and not appearing in the estimates of general funds more than the staff and the studies carried on by the departments of public works and mines, it follows naturally that the detailed studies to be carried on by the staffs of the departments of mines and public works in order to formulate the conditions to which the concessionaries must comply, should be charged to the general funds where there exist funds available for such purposes, the carrying on the labors in the valley of the river Pandan being authorized afterwards to be charged against the local funds where there are funds available for other similar services.

Considering that the above statements were explained somewhat roughly with better intentions than success, and trusting that they will be considerably dealt with by your excellency and by the governor-general, this general inspectorate has the honor to propose:

First. That the admission of petitions for registration and investigation of mines within the valley of the river Pandan, district of Naga, island of Cebu, be temporarily suspended for the period of eight months, publishing the proper decree at the same time as the decree of cancellation ordered by the general directorate of civil administration respecting the mines "Casilda y Josefa," situated in the same valley.

Second. That this action be reported to the minister of the colonies, also sending all the facts necessary for him to appreciate its advantages, and for this purpose this general inspectorate will prepare as soon as possible the treatise in which will be stated all existing facts which are now scattered in various treatises and official publications.

Third. That the minister of the colonies be requested to communicate his decision by telegraph in order that, in case it should be favorable, the investigation may be promptly carried into effect, which have to be conducted by the general inspectorates of mines and public works.

Submitted for your excellency's decision.

Manila, March 14, 1894.

ENRIQUE ABELLA Y CASARIEGO.

MARCH 15, 1894.

EXCELLENT SIR: The directorate approves in every respect the important and meritorious ideas distinctly but modestly stated in the preceding article, and is of the opinion that your excellency can well authorize the decree proposed, as well as order that with all possible diligence the inspectorate draw up the treatise mentioned in this excellent article.

Submitted for your excellency's decision.

A. AVILES.

March 16; so ordered.

MANILA, *March 16, 1894.*

In conformity with the recommendation of the general directorate of civil administration and general inspectorate of mines, the admission of petitions for registration and investigation of mining claims within the valley of the river Pandan, from its source in the district of Uling to its mouth, is temporarily suspended for eight months.

Publish this, and communicate it to interested parties.

BLANCO

GENERAL DIRECTORATE OF CIVIL ADMINISTRATION, MINES.

MOST EXCELLENT SIR: The most excellent governor-general of these islands has deemed it proper to issue the following decree [here is copied the preceding decree from the words "Manila, March 16, 1894," to and including the words "to interested parties"], which I communicate to your excellency for your information and to be acted upon.

May God protect you many years.

Manila, March 16, 1894.

A. AVILES.

To the most excellent POLITICO MILITARY GOVERNOR OF CEBU.

A copy.

ABELLA.

DIRECTORATE-GENERAL OF CIVIL ADMINISTRATION, MINES.

I have the honor of sending to your excellency a decree of the governor-general and another of this directorate to be inserted in the Gazette, ably published by yourself, which should be published simultaneously.

God protect your excellency many years.

Manila, March 21, 1894.

A. AVILES.

To the DIRECTOR OF THE MANILA GAZETTE.

A complete copy of the decree inclosed.

A copy.

ABELLA.

MANILA, *April 18, 1894.*

To the most excellent MINISTER OF THE COLONIES.

MOST EXCELLENT SIR: The general inspectorate of mines on March 14 last past submitted a recommendation for the realization in a practical manner of the development of the coal-mining industry of these islands, which is so necessary for the wealth of the country and for its defense,

and which is recommended by many royal orders issued by the ministry under your able direction.

And considering the importance of the matter, the general directorate of civil administration and the General Government examined carefully the proposal, and approve of it in its entirety, and accepted the same, issuing in consequence thereof my decree of March 16, published in the Gazette, of this capital, on the 24th, in which is suspended the admission of petitions for registration and investigation of mines in the valley of the river Pandan, in Cebu, for eight months.

During these eight months the department under your excellency's direction can examine carefully the facts and statements contained in the proposal, which I have the honor to forward inclosed to your excellency, requesting that you communicate by telegraph your decision to this General Government in order that the time may be extended, or the suspension already decreed done away with, or the immediate carrying on of the investigation be ordered in case the decision should be favorable.

The reading of the accompanying documents will show to your excellency that no great sacrifice is imposed upon the State in carrying out the proposal made, since even if a certain capital has to be invested for two years, very insignificant considering the importance, it is clearly and certainly shown that the capital can be recovered in a very short time.

God guard, etc., most excellent sir.

A copy.

TREATISE.—PROPOSAL FOR THE ADVANTAGEOUS ENCOURAGEMENT OF THE COAL-MINING INDUSTRY OF THE PHILIPPINES.

Treatise prepared by the general inspectorate of mines, giving more details regarding the proposal accepted by the general government of the islands, March 16, 1894, in which is proposed the method of securing this advantageous encouragement in the preparation by the State of the deposits of Uling, in Cebu, and in conceding the mines so prepared to a national company which would reimburse the Government for the capital so advanced in a short time and with certainty.

GENERAL CAUSES OF THE DEPRESSED CONDITION OF COAL MINING IN THE PHILIPPINES.

Nearly half a century has passed since the first attempts at developing coal mines in the Philippines were made without there existing, up to the present time, a single mine with a production of sufficient importance to demonstrate in a practical manner the advantages and gains to be derived from such enterprises properly conducted. Nevertheless, it can be said that this result is not due to the smallness of the deposits nor to the poor quality of the combustibles.

These deposits are found in large quantities, especially in Tayabas, Albay, Masbate, Samar, Mindoro, Cebu, Negros, and Mindanao, with excellent outcroppings of veins attaining 5 meters in thickness, which, upon being partially investigated or developed, have been shown to possess the most advantageous qualities in regard to their geological age, upon which can be undertaken possible exploitations as those

in Russia, Austria, Italy, and even in Spain, and as those which are commencing to be developed in Borneo upon deposits similar to those of the Philippines.

Moreover, the coal extracted, often in bad condition, from these deposits, upon being tested on various occasions by laboratory assays and practically in war vessels and merchantmen, has always given very acceptable results, equal to those produced by Australian coal, formerly almost exclusively used in the Philippines, and superior to those obtained from combustibles from Japan and Borneo, which are now used in large quantities.

Therefore the unsuccessful result obtained in the development of coal mines in the Philippines should be attributed to other causes, which we will now briefly enumerate:

When the first attempts at coal mining were made, the inexperience resulting from want of professional knowledge of the matter and the inevitable results as in every new industry caused by bad management, the exaggerated and enthusiastic ideas imagining enormous deposits and fabulous profits, and especially the great amounts expended in roads and other improvements fatally necessary to the development of those enterprises, exhausted the resources of the first to attempt such development, and then those exaggerated and enthusiastic ideas of those early days were turned into dismay and premature and unjustified abandonment, which produced inevitably the ruin and discredit of a business which properly conducted would have been able to have greatly benefited this business and the country.

At present, although the professional investigations made by the State have brought about the establishment of some small developments, the want of confidence of business men and capitalists is preserved to such an extent that these establishments have not been able to secure the necessary funds to open or improve roads for transportation which are necessary for their development, they being obliged to transport their coal to shipping ports in carts drawn by carabaos, at a cost of transportation of from \$3 to \$5 per ton.

These difficulties create a condition of affairs so disastrous to these enterprises that it can even cause their ruin, thereby further discrediting this unfortunate industry and retarding fatally and inevitably its definite establishment for thirty or forty years more.

GREAT DAMAGES CAUSED BY THIS DEPRESSION.

The damages resulting to the entire country from this state of affairs becomes of greater importance every day.

During the last year (1893), according to the commercial statistics of customs, there were imported into the Philippines some 85,000 tons of coal, in round numbers, coming from Australia (69,900), from Japan (8,200), from China, originally from Borneo (4,700), and from the United States of America, probably in ballast (2,200). This coal has been sold at an average price of not less than \$9 per ton, so that the 85,000 tons imported cost the country \$765,000, and adding to this the \$116,000 mentioned in the estimates of coal for the navy-yard it produces the respectable sum of \$881,000, which, excepting a small fraction for commissions and warehouse charges, goes to enrich the mining industry of Australia, Borneo, and Japan, and the shipping carried under the English or the Japanese flag, to the great detriment of a country naturally favored with deposits of this same combustible mineral which could be utilized.

The failure to develop these deposits of combustible mineral not only causes this uncalled-for and unnecessary expense to the Philippines of nearly a million of dollars, but it also places them in danger in the case of defense in an international war, since the defense of an archipelago has to be by a navy and the defense by a navy of territory so distant from the mother country can only be assured by the development of its own coal resources, as no one is ignorant of the fact that that can not be done in a few days nor in a few months.

NECESSITY FOR PRACTICAL ENCOURAGEMENT OF THESE EXPLOITATIONS.

It is the sacred and essential duty of the entire Government, therefore, to establish and implant in a definite manner the coal-mining industry in the Philippines; and this duty has not been forgotten by the Government of the mother country, as is proved by the large number of royal orders which for this purpose have been issued after the existence was known of coal deposits in the Philippines. But unfortunately those sovereign dispositions have not produced, up to the present time, the proposed object, and the business can not be given confidence by simple orders and recommendations, which have been obstructed by such great difficulties, nor can there be created a spirit of cooperation, which is not considered necessary in a country where individually such good rates of interest are obtained upon capital. Therefore, the time has come for putting into effect the lofty ideas of the General Government, proposing for the encouragement of the coal-mining industry in the Philippines other methods more powerful and effective than those of recommendation and advice, which have been employed up to the present time.

The exploitation by the State of one of the coal-mining regions of these islands, made with the object of providing for the exigencies of an international war, would serve as an example and model to other private enterprises which undoubtedly would be undertaken, and would be a method which perhaps would give certain good results, but in addition to exceeding the proper functions of the Government, has such practical disadvantages, well known to all, that it ought to be abandoned at once, although many persons defend the idea when applied to infant industries such as those of this archipelago, in which effectively, as a means of instruction, experiments are being carried on in the agricultural experiment stations.

METHOD OF EFFECTING THIS ENCOURAGEMENT.

But, setting aside this system, although applied with the special intention of practically demonstrating that good results can be obtained from the development of coal-mining properties, let these improvements be made upon any deposit whatsoever, overcoming the difficulties which are now encountered in order that a private enterprise may realize this result, then it is certain that this practical example will not only cause the development of all other known deposits of combustible minerals, but will cause the discovery of other new ones.

Of all the difficulties which we have briefly mentioned in the beginning the most serious, that which in spite of the advancement of the times still exists and will continue to exist until a practical example destroys it, is the want of confidence of capitalists in this business, so that if the State succeeds in destroying it, substituting itself in certain respects for these capitalists, the result will be obtained. This temporary substitution can be realized by means of an indirect aid to be repaid, the State preparing from a mineralogical point of view a suitable place for mining development, without performing actual exploitation, and transferring this place so prepared to a national company, with sufficient guaranties, which would commence its work of extracting and selling coal, obtaining in this manner from the beginning profits more than sufficient to pay the interest on its own capital and to repay in a short time that advanced by the State.

SELECTION OF THE DEPOSITS AND THEIR DESCRIPTION.

But in order that the Government should decide to make this preparation with the certainty of an outcome which would not destroy its prestige, which would assure the encouragement treated of and the repayment which should be realized, it is nec-

essary that it select with great care and prudence the district in which this preparation is to be made, and therefore the selection is limited to some of the regions studied by the Government in the past few years.

The island of Cebu complies with these conditions, and within this island there is no district so appropriate as the valley of the river Pandan, in the division of Naga, in which are situated the deposits of Uling and Lutac, which, as we will afterwards prove, not only contain various veins of coal of a merchantable quality 60 centimeters in thickness, but others 5 meters thick, which, has been investigated for 200 meters following the slope. The selection of these deposits is justified, moreover, by the great amount of labor and capital required for its preparation, much greater than are required in the other deposits of the island, as is especially shown by the fact that in spite of having belonged three years to the mining company Nuevo Langreo, this company did not succeed in extracting a single ton of coal nor furnish the force of laborers required by law for its claims, while in the mines of Danao it has been able to carry on the work, although limited to an insignificant scale.

If, in spite of this precedent, which has a bad influence on the public, and in spite of the first unfortunate attempt at developing this property, made by Rojas & Co., the State succeeds in preparing the mines of Uling and Lutac, making the profits clear and undeniable which can be obtained from this development, it can not be denied that the prestige and the encouragement of working the coal mines will have been realized completely, banishing forever the discredit in which they are now submerged.

Let us now see if the conditions of these deposits confirm the possibility of their profitable development and advise their development by the State, and for this purpose let us commence by resuming in a few words the difficulties experienced in performing the small amount of work which has already been done there.

When the mines of Uling were first worked by Rojas & Co. the cultivated region of the coast only extended to the little valley called Pandan, the upper part of the river being covered by a high and dense forest, which, although it facilitated the acquisition of necessary timber for the development of the mine, increased the difficulties and expense, to a great extent, of building roads and establishing workshops, buildings, and houses, besides making those places so unhealthy, especially when they commenced to clear the ground, that for a few years this location was the terror of the province. This unhealthy condition produced a scarcity and unbearable high price of day laborers, and therefore compelled a slow prosecution of the work and the expenditure of large sums in performing this work.

Under these conditions the necessary buildings were erected and a road suitable for carts was constructed, not a good one, but expensive, which ended at the wharf; and among other labors a little mining was done, which is marked in black, green, and yellow in the annexed plan, prepared by the engineer, Mr. Centeno, in the year 1867, which was the year in which the enterprise suffered serious drawbacks. In order to remedy these difficulties they endeavored to combine their resources with those of the company of Alpaco, offering besides great inducements to new capital, which they desired to procure. "This was done," adds the same Mr. Centeno in his *Memoria Geologica Minera* de 1876, "and we were working to carry it out, anxious to see an enterprise for coal mining properly established in the Philippines; but unfortunately the business was already old, it had upon it the weight of eighteen years of failure, and it was therefore impossible to raise it up."

Some time afterwards the two large transversal entries cut the main vein, as is indicated by red lines upon the plan, proving thereby the continuance of the main vein to more than 200 meters of depth along its slope, and making immediate production possible; but in spite of this decisive circumstance, having occurred during the same period as the death of the most important and enthusiastic member of the

enterprise,¹ the heirs, not having confidence or knowledge of the matter, and dismayed by the enormous expenses already incurred, entirely abandoned the mine, sacrificing the buildings and materials on hand.

These deposits remained in this state of abandonment some twenty-two years, at the end of which the Nuevo Langreo Company, with a small capital at its disposal, which hardly was sufficient for the development of its Danao mines, petitioned for the deposits of Uling, and they were conceded to it by the easy method established by the Spanish mining law. These deposits remained in their hands three years, during which they did not accomplish anything extraordinary except to reopen in an indifferent manner some hundred meters of the large transversal entries made by the Rojas company, and therefore the Government, after having granted all favors consistent with its prestige and the execution of the laws in force, was compelled to declare the cancellation of this concession, and the general inspectorate of mines now avails itself of this circumstance to make the proposal of which this treatise deals.

We will now briefly deal with the condition of these deposits from an industrial point of view.

In the creeks known as Campacan, Uling, Nasipit, and Cambaji five outcroppings appear, which are shown on the attached plan of that district, which correspond respectively with the large vein of 5 meters which appears in the Nasipit Creek and with the other three or four remaining veins, the mean direction indicated by the stratifications of the earth being NNE. These three or four veins appear on the surface with from 1.20 to 1.25 meters of merchantable coal.

In order to ascertain the conditions of these veins beneath the surface, in addition to the plan of the workings of Mr. Centeno, which accompanies this article, we insert further on, having taken it from the *Memoria Geologica Minera*, written by the same engineer, a table of all the stratifications encountered in one of the large transversal galleries, which, from its length, must be the one on the lower level or the first gallery of the plan (color black and red). The table so taken, reduced to meters, is as follows, commencing at the mouth of the gallery: 91.39 meters alternating slaty clay and sandstone, 0.58 of coal; 21.17 of slaty clay and sandstone, 0.58 of coal; 11.70 of slaty clay and sandstone, 0.58 of coal; 0.83 of slaty clay, 0.83 of coal; 514.91 of slaty clay and sandstone, 4.75 of coal vein, second on the plan.

The details of the position of these stratifications are not indicated in the treatise referred to, nor is it shown whether the veins of coal annotated will be found, as is supposed, in the corresponding ventilating galleries. For this reason we have not properly shown these veins upon the cut or cross sectional drawing of the veins, which would form a geological cut which would have been of very great use for our purpose.

Keeping in mind the facts to be used, it should be deduced—

First. That the large vein, the second vein of the plan, the outcropping of which with 5 meters of merchantable coal appears in the Nasipit Creek, has been intersected by the second gallery (color green) at about 120 meters to the NNE. of its outcropping following its course and at about 50 meters following its declination; and likewise by the large transversal or second gallery (colors black and red), at about 200 meters, always NNE. from the outcropping following the course and at about 200 meters following the declination.

Second. That the said first vein of the plan which has outcroppings in two places some 80 meters apart has only been cut by the third new gallery (color yellow) at about 20 meters below the surface, following its course; which appears to indicate the existence of a lack of depth.

Third. That on the other hand, the large transversal or first gallery of the plan has

¹Mrs. Margarita Rojas de Ayala.

intersected four other veins which can be utilized, which do not have any outcropping. For the preparation and development these four veins should be considered as three, the first two containing some 60 centimeters of merchantable coal and the last 2.25 meters, with an intermediate vein of 0.83 meter, or 1.42 meters of coal which can be used.

ESTIMATE OF THE COAL SITUATED ABOVE THE LEVEL OF THE ULING RIVER.

Under these circumstances, let us see the total amount of coal at the lowest estimate that can prudently be calculated in the deposits of Uling, that can be worked above the level of the large transversal gallery which is shown in the plan.

Whatever lies below this level should pertain to a second period of the development of these mines, concerning which we should not occupy ourselves at present.

We know that the large vein of 5 meters of merchantable coal continues almost with the same thickness to the level of the large transversal tunnel, giving 200 meters of depth of the vein which can be utilized, and that it has been investigated in a NNE. direction an additional 200 meters from its outcropping; therefore, as we are not treating of veins of metal, in which the richness can be concentrated in pockets, it should be supposed that this vein can have a horizontal extension of 2 or 3 kilometers or following its direction; but in order to be reasonably conservative, perhaps excessively so, we will suppose that only 500 meters can be figured on as the extension in this horizontal direction. From this point of view the coal contained in the vein will be 500 by 200 by 5, or 500,000 tons, excluding the surplus which would result from considering the average thickness of the coal, which would not be less than 1.30, and, therefore, about 160,000 more.

In the same conservative manner we will suppose that the three or four veins of 1.20 or 1.25 meters seen in the outcroppings in the Campacan and Cambaji creeks only consist of 300 meters of horizontal extension and 100 meters in depth along the declination, resulting that one of the veins will contain 300 by 100 by 1.20, or 36,000 tons, and in the case that there are only three veins corresponding to all the outcroppings there will be 3 by 36,000, or 108,000 tons of coal.

Applying these same estimates to the veins intersected by the large transversal gallery, giving two veins containing 60 centimeters of merchantable coal, and another with the intermediate vein, containing 1.40 meters of coal that can be utilized, there results 300 by 100 by 0.60 by 2 veins, or 36,000 tons, and 300 by 100 by 1.41, or 42,000 tons.

Adding all these estimates we obtain:

	Tons.
In the large vein 5 meters in thickness.....	500,000
In the 3 veins appearing on the surface	108,000
In the 2 veins of 0.60 intersected by the transverse gallery	36,000
In the vein together with intermediate vein.....	42,000
Total	686,000

If, being overconservative, in addition to the limited measurements which we have just supposed and the disregard of 30 per cent of the thickness, we reduce the estimate 10 per cent more for waste, we will obtain, in round numbers, 600,000 as a minimum figure for the coal which can be declared to be above the level of the large transversal gallery, or, in other words, above the level of the river Uling.

It is clear that in developing these veins there must be found, looking at the matter fairly, a much greater quantity of coal than that indicated, but we have preferred to be especially conservative in these estimates in order to show that an optimistic spirit did not guide us, and to demonstrate that, without reservations of any kind, a

large capital can be invested in these deposits with the certainty of recovering it in a short time, however small the price may be that is obtained per ton.

QUALITY OF THE COAL.

Let us now explain the facts which exist regarding the quality of the coal of these deposits, the application which can be made of it in these islands, the price at which it can be disposed of, and therefore the advantages which can be derived from well-directed exploitation.

The first assays which were made upon the coal from the outcroppings of these veins (and of Alpaco) in the school of mines in Madrid many years ago, gave the following results on a basis of 100 parts:

	Maximum.	Minimum.
Carbon.....	54	36
Ashes.....	20	6
Water and volatile material.....	44	40
Units of heat.....	5,760	4,140
Density.....	1.46	1.10

It burned with a brilliant and large flame and did not produce genuine coke, but a hollow and bright substance, which, after being burned, left ashes of a reddish and yellowish color.

Mr. Centeno, who knew the coals extracted by the work performed upon these deposits, says (Memoria Geologica Minera), regarding its quality, as follows: "These four veins (those of Uling and Alpaco) produced lighter and drier coals than that (that of Sibod, in Lutac) and did not form coke; nevertheless they are especially applicable for steam engines, because they produce a large flame, hardly discoloring the tubes of the boilers, and affect very little the furnace bars."

Likewise in 1862 the war vessel *Reina de Castilla* and merchantmen successfully tested the coal from the Uling mines.

On the other hand, it is known that the results known recently by chemical assays and practical tests of the coals from Compostela and Danao can and should be applied to those of Uling, since they treat of deposits of the same formation, the first deposit alongside of the latter on the same island and under very similar circumstances, though of course accidental variations can be found not only in different veins, but even in the same vein. Therefore we include herein (Appendix No. 1) the certificate of the comparative laboratory essays made in 1878 upon coals from Danao and Compostela compared with foreign coals then being sold in Manila, the demonstrated and practical result deduced therefrom (Appendix No. 2), and the official test still more important of more recent date which has been made by the Navy (Appendix No. 3).

From the foregoing it can be deduced:

First. That these combustibles, although mineralogically and geologically they should be called lignites, are of excellent quality, very rich in carbon and containing little ash, and possessed of great heating qualities, almost equal to those of Australian coal, so extensively used in the Philippines.

Second. That they can be used to good advantage as fuel for furnaces in steam engines, both on account of the readiness with which they give out flame and from the very important circumstance of not clogging the flues nor giving dense smoke, nor producing a large quantity of ashes.

These excellent qualities are now so well known to all machinists and engineers of the merchant marine of these islands that to-day, since the Australian coal imported

is being substituted by coal from Japan and Borneo, they desire to use Philippine coal and always prefer it to the coal from these last two countries.

COMMERCIAL VALUE OF THE COAL.

The profits that can be obtained from these deposits must depend upon a multitude of circumstances, such as the location, quantity, the more or less well-directed system of the development, manner of extraction, and the market price which can be estimated for the product. As we already know, the location, quantity, system of development, and the manner of extraction will have to be established in the estimates for the preparation and the development which will be made before the commencement of the work, so we will now commence by inquiring into the market price of those combustibles with reference to the average price which the best coal consumed in the archipelago has attained.

The coal which is preferred for ordinary use or for use in furnaces in steam engines is Australian coal, which for many years has been sold at prices ranging from \$8 to \$11. Its average price can therefore be stated to be \$9 per ton, as we have said before.

We will suppose that the practical result obtained by the burning in those furnaces would only be two-thirds of the heating power of the coal consumed, which is the amount generally obtained in the majority of steam engines.

Under these conditions the real value of a million physical units of heat produced by the combustion of coal from Australia will be (see Appendix No. 1 for the value of the heating power of coal, not considering the volatile materials):

$$\frac{1,000,000 \times 9 \text{ pfs.}}{1,000^k \times \frac{2}{3} 6,205} = 2.17 \text{ dollars (Mex.).}$$

If we give the same value to the million of heat units of the coal of these islands and figure out the market price X unknown, this price will be the equivalent of the \$9 estimated for the Australian coal. We will take as the heating power of the Philippine coal the average 5,736 of the two figures inserted in Appendix No. 1 corresponding to coals from the interior of the mines, without reference to the heat units of the volatile materials. We will have then:

$$2.17 = \frac{1,000,000 \times X}{1,000^k \times \frac{2}{3} 5,736} \text{ and}$$

$$X = 8.30 \text{ dollars (Mex.).}$$

In round numbers, these combustibles should be sold, therefore, at an average price of about \$8 per ton as long as the general conditions of the coal market of this extreme part of the Orient does not vary, which is improbable. In general, it can be established that its price ought to be 8 per cent lower than the price of Australian coal, taking into consideration the heating powers, without regard to the fluctuations of the market.

PROPOSED PRODUCTION.

Considering the difficulties encountered in establishing a permanent laboring population in any place in the Philippines, even in the island of Cebu, which is one of the most populous, and likewise considering that a sudden and large production of coal would change the conditions of the market, we will fix the production of these deposits at 30,000 tons annually, and on this basis we will estimate the amount of preparation which must be made.

PREPARATION.

In order to realize this preparation under these circumstances it would be necessary:

1. *Mining labors.*—To execute the mining labors necessary. To determine their number and extent—that is, to establish a fixed plan of the preparatory labors—it

would be necessary to possess in advance a large number of definite facts which to-day we are ignorant of, as, for example, those referring to the situation and the different levels between the outcroppings and the ravines or creeks nearest them in which to drift the galleries to work the veins; but as it is necessary to determine these facts and ascertain, even though in a very inexact manner, the amount of expense to be sustained, we will anticipate the following conditions:

(a) That the large vein should be opened by two transversal galleries which would ventilate one another, and divide the deposit into the two levels to be first developed in the future, which could be accomplished by two galleries 200 and 400 meters in length, respectively, and 300 meters more of shafts connecting them, to open which the veins of coal secondly intersected would be availed of. In all some 900 meters of excavation in barren rock for the large vein.

(b) That upon the two transversal galleries cutting the large vein there should be drifted from there four galleries to the NNE. and the SSW., having suitable connections between them for ventilation, and in two years there could be drifted about 1,200 meters of galleries and 800 meters of shafts to connect them, or a total of 2,000 meters of excavations in coal for the large vein.

(c) That at the same time, in the Campacan or the Cambaji creeks, there should be drifted another transversal gallery with the proper ventilating shafts, under the same conditions which we have indicated for the large vein, but to be shorter. There can be estimated about 500 meters of excavation in all in barren rock.

(d) That at the point of intersection of these transversals with the veins of coal there should be opened in them galleries on both sides, with a length of 600 meters, with the proper connecting shafts, which may attain a length of 400 meters. Total, some 1,000 meters in coal.

With these approximate estimates we would have (see Appendix No. 4):

1,400 meters in barren rock, at \$5.50 per meter	\$7, 700
3,000 meters in coal, at \$3.50 per meter	10, 500
4,000 props for the entries, renewed in the second year at 55 cents per prop..	2, 200
Placing of these props	600
Warehouses of light material, property, and tools.....	12, 000
Fee of the superintendent from the inspectorate, who will have to carry on the work, and the salaries of assistant superintendent and the overseers for two years	3, 000
Visits of inspection for two years	2, 000
Contingencies.....	2, 000
Total	40, 000

2. *Railroad for the mines.*—To construct a railroad for working the mines from Uling to the harbor of Tinaan, and the necessary docks for loading.

The harbor of Tinaan is selected as the point for the loading of these coals because it is the only one which really deserves this name on the coast in the immediate vicinity of the mouth of the river Pandan, and in it already exist the docks of the old mines of Uling and Alpaco (see Appendix No. 5).

The confluence of the Campacan and Cambaji creeks, from where the river takes the name of Uling, can be taken approximately as the point of commencement of the railroad (see annexed plan of the region).

From this point to the harbor, following one of the sides of the valley, probably the right side, the road will attain a length of some 15 kilometers, and as the point of commencement is some 150 meters above the level of the sea there results a very acceptable grade of $1\frac{1}{2}$ per cent.

For the transportation of the annual production of 30,000 tons which we have determined upon, it is enough to give the road a width of 60 centimeters.

Under these conditions we can estimate that the construction of a kilometer of

road and the necessary material therefor would cost from \$4,000 to \$5,000; but, in order to anticipate all contingencies which might occur, we will allow a cost of \$6,000 a kilometer, or a total of \$90,000.

CAPITAL NECESSARY.

Therefore in order to carry out the preparation of these deposits, there is needed, approximately:

For the mining labors to be performed.....	\$40,000
For the construction of the railroad	90,000
Capital necessary.....	130,000

We must again say that these figures are the result of a rough calculation in the nature of a preliminary estimate, which only aims to give an approximate amount of capital which the State must advance to realize the preparation of the deposits which is proposed in this treatise. If this proposal, already considerably received by the General Government of these islands, should be considered in the same manner and adopted by the minister of the colonies, the above figures can be rectified and made definite by careful investigations, to be made by the general inspectorates of mines and public works of these islands.

TIME OF REPAYMENT OF THE CAPITAL.

Let us now see how much time is required for the repayment of the supposed capital of \$130,000.

From the facts which can be deduced from the badly managed enterprises which are now being carried on in the island of Cebu (Danao), it seems to appear that the coal can be produced at the mouth of the mine for \$1.40 per ton, so that, although paying from \$3 to \$5 for transportation, these enterprises have been able to realize profits of from \$2 to \$4, since they have sold their coal in Danao at from \$8 to \$10 per ton.

Under the conditions which would be established for the development of the mines at Uling, with a production of 30,000 tons, and with perfect transportation facilities, and with systematic arrangement of the workings, it ought to be supposed that the profits to be obtained would be larger than that which we have just indicated, but in order to remain within the bounds of prudent estimates we will suppose that there can only be realized a profit of \$2 per ton.

Applying one-half of this profit to the repayment of the capital and the interest on said capital advanced by the State, we will have:

First year:

Interest at 5 per cent on the total capital of \$130,000.....	\$6,500
Repayment, first annual	23,500

Second year:

Interest at 5 per cent on remaining capital of \$106,500	5,325
Repayment, second annual	24,675

Third year:

Interest at 5 per cent on remaining capital of \$81,825	4,092
Repayment, third annual	25,908

Fourth year:

Interest at 5 per cent on remaining capital of \$55,917.....	2,796
Repayment, fourth annual	27,204

Fifth year:

Interest at 5 per cent on remaining capital of \$28,713.....	1,437
Repayment, extracting this last year 30,149 tons instead of 30,000	28,713

Amount of repayment and interest	150,150
Capital repaid.....	130,000

Demanding, therefore, a tax of \$1 per ton, the repayment and the payment of the interest can be realized in five years, or, in other words, in order to be certain of being repaid the capital used in the preparation of these deposits, the existence of five times 30,000, or 150,000 tons of coal only is required. As much more undoubtedly exists in these deposits, there would be no danger in reducing still more this amount or tax upon each ton.

CONDITIONS TO BE IMPOSED.

Moreover it should be observed that during the payment of this amount of \$1 per ton for the repayment and interest, the company developing the property would secure profits which are very large in proportion to the capital for the development of the deposits. It would therefore be just and proper to demand of this company, for the public benefit as well as its own, that upon the completion of the repayment it would employ the excess in the investigation and preparation of the lower veins which are beneath the level of the valleys, so assuring the second period of development and the entire exploitation of the deposits.

Upon the mines being properly prepared and ready to produce certain profits from the commencement of the work, it can not be supposed that there will be a lack of companies petitioning for the concession of the right to develop these deposits; but in order to avoid the remotest possibility that upon the conclusion of this preparation by the state there will be wanting companies to petition for that concession, compelling the state to commence the work itself or to preserve at great expense and other inconveniences all the other excavations opened, the sale can be announced and the concession thereof made before commencing this preparatory work, but only after completing the definite investigations which we have indicated above, and in order to secure the carrying out of this agreement, which would have to be done in a minimum space of time of two years, it will be necessary to demand of the concessionary a guaranty of a certain amount, depending upon the amount of capital involved, such as the deposit of \$10,000 to \$15,000 in coin or governmental securities, this guaranty to be returned when the repayment has been made to the state, demanding as an equivalent the investigation work in the lower levels which we have mentioned above.

Moreover, in order that the State may be assured of the realization of its plan of encouraging the coal-mining industry of the Philippines without hindering the company holding the concession from obtaining the profits resulting from this exploitation, it will be necessary to impose especial and extraordinary conditions, since we are not treating of an ordinary concession of a deposit, such as is made in accordance with the ordinary mining legislation, but of the concession of some mines prepared to give certain profits from the beginning. Therefore, among other conditions which may be considered necessary, the following should be demanded:

First. That of making in customary manner of a deposit of from \$10,000 to \$15,000 in order to bid for the concession. This deposit to be made as a guarantee, to be retained until the repayment of the capital used by the State, then to be returned to the company in the manner to be specified.

Second. That of constituting a national company three months before making the transfer of the mine, according to notification to be given to that effect, with a minimum capital of \$80,000, which is considered as necessary to undertake the expenses caused by the working of the mines.

Third. That of accepting under an inventory the mines properly surveyed and laid out, the material, the tools, the railroad, the docks, and the necessary rolling stock, at a total cost previously determined at the granting of the concession, the company agreeing to prosecute the development work and to undertake the exploitation in accordance with the requirements of scientific coal mining and subjecting itself to all the conditions laid down by the law then in force regarding mines as

well as satisfying the taxes or contributions which are established or to be established in a general way for mines of the same class.

Fourth. That of having a competent superintendent in the mine, as is demanded by the law in force in these islands regarding coal mining, to be a mining engineer with a diploma from Spain, said superintendent to be a Spanish subject.

Fifth. That of securing continually until the deposits are exhausted, which are conceded to the company, an annual production of 30,000 tons of coal, to be clean, washed and sorted, to the satisfaction of the State superintendent, in order to avoid a bad reputation in the market, either through being mixed with dirt or slate or through containing quantities of pyrites, which would make it dangerous in warehouses or in the coal bunkers of ships.

Sixth. That of repaying the capital, fixed at the time of the sale as money spent by the State, and that of paying 5 per cent interest, paying so much per ton semi-annually, calculating on the production indicated of 30,000 tons.

Seventh. That of executing necessarily deep mining labors, below the level of the valleys, upon the repayment of sums advanced and interest to the State, then recovering, in accordance with the values of the work done in this development, the amount of the deposit of \$10,000 to \$15,000, which was made upon award of the concession. These valuations will be made by the State superintendent.

Eighth. That of answering for exact fulfillment of the contract with the total value of the labor performed, roads, buildings, material, and tools, the State being able to impose fines not to exceed \$500 for slight omissions properly proved.

The other administrative details necessary for carrying out this proposition in case it should be favorably adopted by the minister of the colonies, as it has already been done by the General Government of these islands, should not be specified in this treatise, but we can indicate the convenience of adopting rapid and summary measures of an extraordinary character since we are treating of an industrial enterprise of exceptional importance to this Archipelago under existing conditions.

Manila, March 31, 1894.

ENRIQUE ABELLÁ Y CASARIEGO.

APPENDIX NO. 2.

PRACTICAL AND USEFUL QUALITIES OF THE COAL.

[De la Rap. Descrip. Fis. Geo. y Min. de Cebu.]

Steam-making power.—In order to prove these deductions under another point of view, let us now estimate the practical and useful qualities which these combustibles can furnish in the production of steam in the generators in the known types of steam engines; and as the only combustible well tested is the best from the Compostela mines, we will concern ourselves alone with the figures of the assays made of them, because there is no doubt that all the lignites of which we treat are very similar in their composition and heating qualities.

For our object the types of steam generators can be reduced to two—generators of low pressure, or of condensation, and generators of medium or high pressure, or without condensation. The first of the former receives the water from the condenser at a higher temperature than the ordinary, varying with certain details of construction, but which we can suppose, without varying much from the truth, to be about 40° C. The latter take the water at ordinary temperature, or the temperature of the atmosphere, which in this climate is about 30 degrees.

We will likewise suppose, as is generally the case, even in machines well constructed and in good condition, that in practical use only two-thirds are used of the

heat given out by the combustion of the coals which are burned in the furnaces. Under these circumstances the amount of steam at 100 degrees which each kilogram of coal can practically produce will be, respectively, when there is condensation—

$$\frac{\frac{3}{4} 5,829^{\circ}}{550^{\circ} \times 100^{\circ}, 40} = 6 \text{ k, } 37 \text{ for that of the gallery "Esperanza;"}$$

$$\frac{\frac{3}{4} 5,643^{\circ}}{550^{\circ} \times 100^{\circ}, 40} = 6 \text{ k, } 16 \text{ for that of the gallery "Caridad;"}$$

$$\frac{\frac{3}{4} 6,205^{\circ}}{550^{\circ} \times 100^{\circ}, 40} = 6 \text{ k, } 18 \text{ for Australian coal;}$$

$$\frac{\frac{3}{4} 7,530^{\circ}}{550^{\circ} \times 100^{\circ}, 40} = 6 \text{ k, } 23 \text{ for that of Cardiff,}$$

and when there is no condensation—

6 k, 26 for that from the gallery "Esperanza;"

6 k, 06 for that from the gallery "Caridad;"

6 k, 67 for that from Australia, and

6 k, 09 for that from Cardiff.

These same figures, but inverted, would give us in the supposed or similar conditions the quantity of combustible necessary to produce a kilogram of steam at 100 degrees, or, respectively—

. 156 k, of coal of "Esperanza" for machines with condensation;

. 159 k, in those without condensation;

. 162 k, of "Caridad" coal for the former, and

. 164 k, for the latter.

. 147 k, of the Australian coal in the former;

. 149 k, in the latter, and lastly,

. 121 k, of the English coal in the former and

. 123 k, in the latter.

These figures having shown to us the practical steam-making power of each one of the combustibles we are comparing, confirm the opinion formed only in view of the composition, convincing us also that Filipino coals can really compete with Australian coals, since there is such a slight difference between their respective steam-making powers.

This difference is, on the other hand, much greater between the English coal and our coal; but in spite of all, we believe that the latter can compete with the former through the more advantageous price, which will overcome the difference in quality.

APPENDIX NO. 3.

QUALITY OF THE COAL.

[De la Rap. Descrip. Fis. Geo. y Min. de Cebu.]

Tests in the navy.—In order to include and unite herein all the facts referring to the quality of this coal we will now take up the many tests made by the navy since 1853, in which were executed the first by the ships *Elcano*, *Reina de Castilla*, and *Jorge Juan*.

It seems that a definite result was never obtained regarding this question, nor was the experience acquired ever recorded, but it is certain that almost all the steamships which have been on this station have tested the coal of the island of Cebu, and always as if they were treating of a matter completely new and unknown. So we will not enumerate all, repeating the same views, but will content ourselves with the experiments executed most intelligently and with results least indefinite.

By the Magallanes.—In 1856 the steamship *Magallanes*, burning in its furnaces coal

from Guilaguila, generated steam in one hour, consuming 28 quintals of coal; and with English coal the same time was required, but only 24 quintals were consumed. The hourly consumption with the coal of Guilaguila was from 9 to 10 quintals, or 1 more than with English, producing in the combustion little smoke and few ashes.

By the Reina de Castilla.—In 1862 the steamship *Reina de Castilla* tested the coal from Alpaco, mixed with equal parts of English coal and Australian coal, producing the following results:

	Cardiff alone.	Cardiff and Alpaco.	Australian and Alpaco.
	<i>Pounds.</i>	<i>Pounds.</i>	<i>Pounds.</i>
Weight of equal quantities.....	100	15	96
Mean consumption per hour and horsepower.....	10	11	10.5
Ashes produced per hundred.....	8	9	7
Cinders produced per hundred.....	3	3	4.1
Soot produced per hundred.....	1	1	1.5

The engine worked during these tests at a mean pressure of 7 pounds, giving 19 revolutions per minute, with two degrees of expansion.

By the Sudaste.—In a letter written by Mr. Centeno from Manila to the *Revista Minera* (Vol. XVIII), it is stated that the merchant vessel *Sudaste*, in the voyages from Manila to Cebu and return, used 43 tons of English coal in the former and 51 of Alpaco coal in the latter, with equally good weather, and the same time of 50 hours for both trips.

By the Prueba.—In the year 1873 the first tests were made with coal from Compostela on board the gunboat *Prueba*, of the division of Cebu, there being secured some incomplete results which, according to official information in our possession, prove that this coal is of far better quality than that from Australia formerly consumed.

By the Marques de la Victoria.—In the Official Gazette of Manila, of July 19 of the same year, were published the results of the tests made during the preceding month by the steamer *Marques de la Victoria* and by the arsenal of Cavite.

It can be deduced from the former that these coals burn freely, requiring fifty-eight minutes to generate steam, and that the ship being put in motion with the first degree of expansion with a constant pressure of 19 pounds without the use of artificial draft, there was consumed 98 kilograms per horsepower and per hour, instead of the 39 generally used at this same degree of expansion, there being produced after the combustion a small quantity of cinders which did not cling to the furnace bars, and there being noted, upon the experiments being concluded, very little dirt on the tubes. The time is not specified which was required by the foreign coal to generate steam, nor the exact quantity of cinders and ashes with the combustibles produced on the test; but in the tests made by the arsenal of Cavite these facts were completed, the results being as follows, much more definite and interesting:

Table of the tests made on the 20th and 21st of the present month of the coal from the "Esperanza" and "Caridad" mines.

Time required to produce steam.....	minutes..	20
Time required from this moment to the production of 40 pounds	do....	30
Total.....	do....	50
Time during which the machinery was in operation	do....	70
Coal consumed from this moment until the completion of the test, kilograms		43

Water evaporated during the test	kilograms..	280
Water evaporated by each kilogram of coal, or the actual generating power of the coal	kilograms..	6.51
Weight of the ashes	do....	9

Arsenal of Cavite, June 27, 1873.

MANUEL GINART, *The Commander.*

A copy.

ANTEQUERA.

Other steamers.—After this other gunboats of the naval division of Cebu and some merchant vessels have consumed on various occasions this kind of combustibles with good results, according to the statements of their commanders, engineers, and captains.

Recent tests.—Lastly, very recently other official tests have been made by superior order at the arsenal of Cavite and by the vessel *Santa Filomena* with results still more complete and noteworthy than the preceding.

At the arsenal.—At the arsenal were made tests in a boiler without a jacket, so that the steam came in free contact with the air, giving, after four days, the following results:

Surface of furnace bars	square meters..	1.24
Number of furnaces		2
Total surface of furnace bars	square meters..	2.48
Surface heated directly	do....	16.58
Tubular surface	do....	54.12
Total surface heated, except ash pans	do....	70.70

The experiment having been conducted with the greatest care for four days, the following result was obtained:

	Atmosphere.	Depository.	Boiler.
Temperature:	°C.	°C.	°C.
Maximum	33.44	31.66	98.88
Minimum	26.66	27.22	29.44
Medium	30.55	29.44	64.16

Carbon consumed from the time ebullition commenced until the conclusion of four days' test	kilograms..	3,694
Weight of water evaporated in the four days	do....	24,040
Time consumed in the evaporation	hours..	24
Quantity of water evaporated per kilo of coal	kilograms..	6,500
Ashes obtained	per 100..	2,923
Coal dust obtained	do....	10,068
Soot obtained	do....	135

By the Santa Filomena.—In the report of this boat are given, among others, the following facts:

"The consumption per hour of the coal, ascertained by the amount of coal used during the experiments, was 550 kilograms, or 13.32 tons per day; and as the ordinary consumption of this and other like vessels is on average 12 tons of the coal usually consumed, sometimes having reached as high as 13 or 14, according to the books of the boat, the result is that the difference of consumption indicated is of slight consideration.

"It has been stated that during the proof the pressure was well maintained, while the engine remained in the first and second degree of expansion, dropping consid-

erably when the engines ran at full speed. This also occurred when, a few days before these experiments, the vessel made a test of its engines, notwithstanding that on this occasion the coal was from Wales and from the mines of Brymbo.

"In regard to the steam-making power of this combustible, the experiments made give a result which shows it to be undoubtedly very suitable, since it is shown that in the boiler of the arsenal 6,500 kilograms of water were evaporated per kilogram of coal, and as with the kind of boilers which have been used for these tests with the best coal; for example, the Cardiff, there can only be expected from 7 to 7.8 kilograms of steam for each one of combustible, the result is comparatively satisfactory. The residue, after the combustion, in the proportion of 12 to 15,810, are also better than that generally obtained.

"The combustible under consideration has some other qualities which make it very adaptable, one of them being the very important quality of covering the tubes with but little soot and not adhering to the furnace bars on account of the small amount of bituminous substance which it contains. The smoke which it produces is not excessive; its color is gray, and, besides, it is very clean, as during the time when the engine was running the sides and the deck of the boat were not soiled in any way.

"Lastly, it should be noticed also that this coal makes very little dust and that it is not consumed rapidly, circumstances which, added to those already enumerated, make the coal treated of very acceptable for ordinary purposes of navigation even when burned alone; but its mixture with a third of Cardiff ought to give excellent results both as to quality and economy."

It is to be regretted that, with these facts, suitable comparative tests have not been made; but, from all points of view, those made up to the present time prove conclusively the excellent quality of the coal.

APPENDIX NO. 4.

PRICES OF DAILY LABOR AND SOME MINING WORKS IN THE ISLAND OF CEBU

Daily labor.

Mining overseers.....	\$0.50 to \$1.00
Pickmen	.25 .40
Helpers	.20 .25
Men for carts and wagons.....	.20 .25
Surface laborers.....	.20 .25
Carpenters	.40 .50
Helpers	.20 .25
Blacksmiths	.40 .75
Helpers	.25 .40

NOTE.—At present there do not exist special men for timbering the mine; the carpenters on the surface fashion the props, or cut them according to measurements given them, and the men employed in the mine put them in place.

Cost of a set of timbers.

Wood (labor and top piece), 25 cents for two.....	\$0.60
50 wedges.....	.25
Wages of the carpenter	.25
Total	1.10
For one prop.....	.55

Cost of a meter of gallery in coal.

Pickman and helper, two shifts.....	\$1. 35
Two cartmen for each shift.....	1. 00
Cost of a prop.....	. 55
Cost of oil for lamps.....	. 10
Cost of material and tools.....	. 20
Cost of overseeing.....	. 25
Total	3. 45

Cost of a meter of gallery in slaty clay is the same as the preceding figures.

Cost of a meter of gallery in sandstone.—At present the cost is about four times more than openings in slaty clay or coal, but the timbering is avoided always and the expense saved. The result is \$11.60.

NOTE.—They have begun to use powder and drills very recently, but we have not yet positive information as to the cost.

In the largest transversal opened in Cebu there has been found 25 per cent of sandstone and 75 per cent of slaty clay in the galleries. We have, then:

In 100 meters—

25 of sandstone, at \$11.60	\$290. 00
75 of slaty clay, at \$3.45	258. 75

Total	548. 75
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Average cost of a meter in transversal gallery is \$5.50.

APPENDIX NO. 5.

BAY OF TINAAN.

[From the Book of Charts of the Philippine Archipelago.]

Bay of Tinaan.—It is situated in 10° 11' north latitude and 129° 56' east longitude (the dock), and 11 miles southwest from the city of Cebu; it is the loading place for the coal from the mines of Uling and Alpaco; it is situated in a slight curvature which the coast makes at this point. This little bay is a mile wide and its shores are covered with marshes, forming shoals which do not extend out more than 1 cable's length. At one-half mile to the southeast from the little pueblo of Tinaan,¹ which is in the center of the bay, there is a reef of sand and rock, 6 cables long from ENE. to WSW. by 2 cables wide, around which, and almost touching its sides, are found from 12 to 20 meters of water; the extremities of this reef, as well as the points of the bay between which the harbor is formed, have been duly ascertained.

The sounding in the middle of this harbor is from 20 to 22 meters, and diminishes gradually to 5 meters at a distance of 1 cable's length from the dock. In the middle of the channel, to the south, between the reef and the coast, there is a depth of 10 meters of water, while to the north is to be found from 28.4 to 20 meters, having a width of 5 cables' length, which is the best and easiest entrance.

¹ It is only a "barrio."

ROYAL ORDER TRANSMITTED BY THE DIRECTOR-GENERAL OF CIVIL ADMINISTRATION TO
INSPECTOR OF MINES.

MOST EXCELLENT SIR: The minister of the colonies, by a communication dated July 16 last past, and numbered 650, transmitted the following royal order to the most excellent governor-general:

MOST EXCELLENT SIR: Having considered the communication of your excellency, No. 138, of April 18 last past, and the expediente and treatise accompanying it relative to the preparation by the State of the coal-mining region in the valley of the river Pandan, in the island of Cebu, of that archipelago, in which communication your excellency states that there has been decreed the suspension for eight months of the admission of petitions for the registration and investigation of mines in said region, in accordance with the recommendations of the general inspectorate of mines and the general directorate of civil administration of those islands.

It being evident upon examination of the said expediente that the benefit and advantages to be derived from encouraging the coal-mining industry of that archipelago would be very great, the preparation by the State being carried into effect, of the deposits of Uling, in Cebu, and the mines so prepared being conceded to a company which would pay back the capital advanced, with which project the superior commission of mines has given its complete approval;

It being advisable that before proceeding upon the necessary investigation for the realization of the said mining preparation the general inspectorate of public works should be consulted respecting the staff it could furnish for the investigation and plans for the railroad to the mine, and the docks which should be constructed for this purpose, and respecting the probable cost of these works, and the treasury should likewise be consulted regarding the funds which could be available for the realization of such an important project;

Considering that while this information is being acquired the general inspectorate of mines could determine and draw up the list of conditions for the concession of the mines referred to, and prepare said special concession, the General Government being authorized to approve them upon the acquirement of the necessary information;

Considering that before undertaking the work of preparing the mines of the said region there should be taken into consideration the necessary staff to carry out these labors and the funds required for the same purpose,

His Majesty, the King, whom God protect, and in his name the Queen Regent, in conformity with ideas expressed and proposed by your excellency in this very important matter, as well as with the advice of the superior commission of mines, has considered it advisable to decree:

First. That the recommendation and proposal prepared by the general inspectorate of those islands for the preparation by the State of the coal-mining region comprehended in the valley of the river Pandan, subdivision of Naga, in the island of Cebu, of that archipelago, be first approved, and that the action carrying this into effect, taken by that General Government, be likewise approved.

Second. That the general inspectorate of public works of those islands be consulted regarding the staff which it can assign to the investigation and preparation of plans for the railroad and docks required for the works determined upon, and regarding the probable cost of said works.

Third. That the treasury be consulted regarding the funds which it could set aside for the realization of such important works, and regarding the convenience of placing the total amount necessary for said object in the estimates of those islands.

Fourth. That the general inspectorate of mines of those islands investigate and draw up the list of conditions considered proper for the granting of the concession of the mining exploitation alluded to, after the preparation of the same by the State, anticipating the concession to accompany, with the necessary guaranties, and author-

izing your excellency to approve said list of conditions and announce and make the concession in the form and upon the terms which you consider best, after receiving favorable information from the inspectorate and treasury above mentioned, from the council of administration and the general directorate of civil administration of those islands.

Fifth. That after the making of the said concession, and when there exists in those islands a sufficient staff in the department of mines, as the present staff should now be increased, and when the funds are determined upon which should be set aside for the carrying on of the work of the mining preparation planned, the said works, the project, and the railroad should be commenced according to the discretion and judgment of that general government in order to attain a successful conclusion of the important project treated of.

I communicate this to your excellency by royal order for your information, and to be carried into effect.

And the said superior authority having ordered the execution of this decree by an order dated to-day, I transmit this to your excellency for your information and to be carried into effect.

God protect your excellency many years.

Manila, August 20, 1894.

[SEAL.]

A. AVILES.

To the Most Excellent INSPECTOR-GENERAL OF MINES.

RECOMMENDATIONS OF INSPECTOR OF MINES.

MOST EXCELLENT SIR: The royal order, No. 650, of July 16 last past favorably approves the recommendation forwarded to the minister of the colonies on April 18 of this year, referring to the preparation of the deposits of Uling and Lutac, in Cebu, but of the five paragraphs contained in this royal order the three first only can be complied with immediately.

In the first place, there is approved by the first disposition the proposal made and the temporary order of the general government of March 18 last past, and therefore there should be issued a new decree making permanent the prohibition already ordered regarding the admission of petitions for registration of mines within the valley of the river Pandan.

In the second disposition it is ordered that the general inspectorate of public works be consulted respecting the probable cost of the railroad from Uling to Tinaan and of the docks of the latter place, and likewise regarding the staff which can be assigned to carry on the investigation and prepare the plans for these works, and to comply with this order it will be sufficient that the general directorate under your able charge transmit to the said inspectorate this part of the royal order, sending a copy of the proper topographical plan of the region which is in the recommendation, and notifying it that the said railroad has to transport a hundred tons of coal daily; has to commence, approximately, at the confluence of the Campacan and Cambaji creeks, at an altitude of about 150 meters, and to terminate at the docks, which likewise have to be constructed in the harbor of Tinaan, the conditions of which are specified on page 610 of the Book of Charts of the Philippines.

In the third disposition it is ordered that the treasury be consulted regarding the manner of obtaining and making provision in the estimates for the total amount which is considered necessary for the carrying out of this project, and although the exact amount is still unknown, as it can not be fixed until the definite investigations have been made, both for the road and for the dock. As for the preparatory labors in the mine, the third provision can be complied with, since an estimate has already been roughly made in the plan presented and approved heretofore, and by means of that plan and the aptitude of the treasury department of these islands, that depart-

ment can inform you what it considers most convenient, upon this original expediente being sent to them for that purpose.

In the fourth disposition, which orders that this inspectorate investigate and draw up the list of conditions which must be established for the making of the concession of the mines of Uling and Lutac, after they are prepared, it is evident that the first fact necessary to be ascertained in order to draw up this list of conditions is that of the exact cost of the preparation and the time that would be required, because it can not be supposed that any company would solicit the concession of some mines upon their being prepared without knowing what capital it is obliged to pay back and how much time will elapse in awarding the mine for the commencement of the exploitation. It is necessary, therefore, that they conclude in advance the definite investigations of the road and docks and the preparatory labors upon the deposit, in the meantime it being impossible for this inspectorate to comply with the provisions of the royal order to this effect, and a notification should be sent to the minister of the colonies regarding the impossibility of doing this.

But, in stating the reasons causing this impossibility, there can be proposed, at the same time, the methods of realizing in the shortest space of time possible, not only the concession, but also the labors and investigations already approved, along with the guaranties necessary and requisite for a business of such great importance.

The immediate realization of the mining investigations to be carried on by this general inspectorate can be brought about as soon as the engineer arrives in these islands to fill the position designated in the estimates, for, since the plan has been approved, it is now one of the duties of the most excellent governor-general of these islands to order that investigation immediately, considering it as a service to be preferred and very important for the future of the mining industry of these islands. As for the work to be done by the general inspectorate of public works, it can likewise be ordered by the general government of these islands, and it can be supposed that it will be done in a very short space of time, as the investigation and survey of 15 or 16 kilometers of railroad for mining purposes, along with the docks at Tinaan, is not of such importance as other investigations and surveys for railroads of great length and other investigations which this same inspectorate has very recently attended to so successfully in northern Luzon.

Upon the preparation and approval of the definite plans, and since in the list of conditions for the concession planned not only have been stated those referring to the exploration of the mines, but those of an economic character, and those concerning the railroad and the docks, it would be well that this list of conditions be drawn up by a commission composed of a chief of the treasury department, to be designated by the director of the treasury, and the general inspectors of public works and mines, presided over by the most excellent director-general of civil administration, and there acting as secretary an engineer of the inspectorate of mines, and in this manner this list of conditions will contain all the guaranties necessary for the execution of the terms of the concession, in order that having previously obtained the advice of the council of administration it can be submitted for the approval of the most excellent governor-general, and thereupon the publication and concession can be made.

Likewise, this same commission can be advised to determine the most simple form for carrying out the preparatory labors in the mines, granting them powers similar to those possessed by the commissions of ports, with which they will be able to greatly facilitate the proceedings and steps necessary for the completion of those labors.

NOTE.—In conclusion this general inspectorate has the honor to propose to your excellency:

First. That there be transmitted to the general inspectorate of public works the second disposition of the royal order, No. 650, of July 16 last past, as well as the facts known regarding the railroad and the docks projected.

Second. That this expediente be submitted to the most excellent governor-general, proposing to him:

A. That the original royal order be remitted to the treasury department in order that they give the information applicable thereto, as is directed in the same.

B. That a decree be promulgated in accordance with the ideas expressed, declaring the decree permanent which was issued March 18 of this year.

C. That a report be made to the minister of the colonies regarding the impossibility of complying with the provisions of paragraph 4 of the said royal order, demonstrating the methods of concluding all the labors pertaining to the development of the enterprise as heretofore approved by means of a commission composed of a chief of the treasury, appointed by the director of the treasury; the general inspectors of public works and mines, presided over by the most excellent director-general of civil administration, and the secretary being an engineer of the general inspectorate of mines.

Submitted to your excellency for decision.

Manila, September 17, 1894.

ENRIQUE ABELLA Y CASARIEGO.

SEPTEMBER 19, 1894.

MOST EXCELLENT SIR: The directorate approves the within.

A. AVILES.

SEPTEMBER 21.

So ordered.

TRANSLATION OF ABSTRACT OF FOREGOING.

Proposing that this expediente be remitted to the treasury, that the decree of March 18 be declared permanent, and that the minister be informed of the impossibility of drawing up the list of conditions ordered, proposing to him the methods of carrying out the entire plan with guarantees for its execution.

INSTRUCTIONS TO INSPECTOR-GENERAL OF PUBLIC WORKS—GENERAL DIRECTORATE OF CIVIL ADMINISTRATION—DEPARTMENT OF MINES.

MOST EXCELLENT SIR: The most excellent governor-general has deemed it proper to decree the fulfilment of the provisions of royal order No. 650, dated July 16 of the present year, the second provision of which is as follows:

"That the general inspectorate of public works of those islands be consulted regarding the staff which it can assign to the investigation and preparation of plans for the railroad and docks required for the works determined upon and regarding the probable cost of said works."

In order that you can comply with the latter part of the above provision, I transmit to your excellency the topographical plan of the region in which it is proposed to construct the railroad and docks referred to for the development of some deposits of coal which are situated in that district, and notify your excellency—

First. That the said railroad has to transport 100 tons of coal daily.

Second. That it has to commence, approximately, at the confluence of the Campanan and Cambaji creeks, at an altitude above the level of the sea of about 150 meters.

Third. That the natural conditions of the harbor of Tinaan will be found stated at page 610 of the Book of Charts of this archipelago published by the navy.

God protect your excellency many years.

September 19, 1894.

A. AVILES.

To the most excellent INSPECTOR-GENERAL OF PUBLIC WORKS.

A copy.

ABELLA.

DECREE OF GOVERNOR-GENERAL MAKING PERMANENT DECREE OF MARCH 18, 1894.

MANILA, *September 21, 1894.*

By virtue of the provisions of royal order No. 650, of July 16 last, the temporary prohibition ordered in my decree of March 18 of the present year is declared permanent, and therefore petitions for registration or investigation of mines will no longer be admitted for mining claims comprehended within the valley of the river Pandan, in the island of Cebu, from its source in the district of Uling to its mouth in the district of Naga.

Publish this and communicate it to whom it may concern.

BLANCO.

COMMUNICATION TO THE MINISTER OF THE COLONIES.

MANILA, *September 29, 1894.*

MOST EXCELLENT SIR: In attempting to comply with all the dispositions of royal order No. 650 of July 16 last, we have met with the difficulty shown by the general inspectorate of mines regarding the impossibility of preparing the list of conditions for the concession of the mines to be prepared in the valley of the river Pandan, since the exact cost of the preparation is not known, nor the time in which it can be carried out, and it is evident that it can not be expected that any company would solicit such a concession without knowing the amount of capital which it is obliged to pay back, nor the time that must elapse before the mines are delivered to them prepared for immediate exploitation.

Therefore it is especially necessary that the definite investigation regarding the railroad, docks, and the mining labors for the preparation of the deposits be carried out as soon as possible, and this can be done in a short space of time, in spite of the small number of employees, if this work be given the preference on account of the importance of this work for the development of an important industry of these islands.

The general inspectorate of mines states that it can carry on the work as soon as the new engineer arrives who is assigned to that department, and it is probable that the general inspectorate of public works can do the same on account of the comparatively slight importance of the investigation and survey of 15 or 16 kilometers of a mining railroad, compared with those which it has attended to regarding railroads of great length and much more importance.

In order to avoid as much as possible the delays necessarily caused by consultations and communications with different bureaus, without overlooking the certainty of success necessary for a business of such importance, this General Government, in accordance with the recommendation of the general inspector of mines and general director of civil administration, believes that it could create a commission composed of a chief of the treasury, appointed by the director, and the general inspectors of public works and mines, presided over by the general director of civil administration, and the secretary being an engineer of the inspectorate of mines, which commission could be empowered not only to prepare the list of conditions for the concession planned, but of ordering and arranging the manner of carrying out in the best manner possible the preparation of the mines, granting it powers similar to those possessed by the commissions of the improvement of ports. In this commission there is contained the necessary knowledge for successfully carrying on the work intrusted to it in addition to the interests of the State being sufficiently protected. God protect, etc.

I am, most excellent sir,

A copy.

RECOMMENDATIONS REGARDING FUNDS.

MOST EXCELLENT SIR: Being unable to estimate the expense which would be occasioned by the carrying out of the project of the general inspector of mines for

the development of the coal deposits of Uling and Lutac, as among other investigations to be made, the general inspectorate of public works must make those suggested by the royal order of July 16 last, and the same difficulty being encountered in fixing the date of the conclusion of the project, the undersigned is unable to give information sufficiently definite to be of any practical advantage, since the amount of funds must necessarily accommodate itself to the amount of expenses estimated, and the public treasury can provide for new matters with more or less facility in proportion to its condition at the time when the payments must be made. But, as the most excellent minister of the colonies has heretofore approved the treatise and plans prepared by the general inspectorate of mines, I have the honor of showing your excellency that in my judgment the plans should be prosecuted without anticipating too much the probable cost, for anything that develops the public wealth is equivalent to augmenting the public resources, and in this last mentioned case treats of an expense which, being given its class and probable quantity, can not form any real difficulty in the preparation of the estimate for carrying out the work, and is different from the other expenses which the public treasury has to meet, as all sums expended for the carrying on of the work will be paid back.

The general inspectorate of mines, treating of the expenses for the public works, indicates that the investigations to be previously made by the staff of the departments of mines and public works for the fixing of the terms of the granting of the concession should be carried on by the general funds of the Government, and that the labors in the valley of the river Pandan should be borne by local funds. I have already said, and the general inspectorate of mines agrees with me, that this division of expenses follows—I will not say the system, because it does not deserve such a good name—the practices used in the formation of public estimates of the Philippines; but as these practices are not justified in any way in this matter, as upon determination of the class to which a service belongs it ought to be borne entirely either by the State or by the municipalities according as it treats of the work of public interest of a local character, it is not proper to follow practices so slightly justified, especially when there is only one contributor and the expenses caused by carrying out the project have to be returned, and this repayment would offer some difficulties if the contribution for the work was made from both general and local funds and the products of the enterprise to be paid had to be divided between these two funds in settlement of the sums advanced.

If the public officials who have to attend to the formation and preparation of the project are sustained by the State; if the local funds receive the principal receipts from the general treasury of the islands; if the taxpayer is the same in both cases, for neither the State nor the local funds receive revenues which are not obtained by means of established taxes; if, finally, the general inspectorate of mines has not prepared its plan nor the minister of the colonies approved it, but if, inspired by reasons of public interest, and it appearing, in effect, that the realization of this enterprise ought to encourage mining developments by active work, which is the best example in all countries, especially in a country like the Philippines, which is just entering into commercial life, the funds of the State should be the ones to completely pay the expenses caused by the mineral preparation of the coal-bearing property in the valley of the river Pandan, in accordance with the plan proposed by the general inspectorate of mines.

Such, at least, is the opinion of the undersigned, and which is respectfully submitted to the superior judgment of your excellency.

I am, most excellent sir,

J. GIMENO AGIUS.

MANILA, October 18, 1894.

DIRECTORATE-GENERAL OF CIVIL ADMINISTRATION,
DEPARTMENT OF MINES.

MOST EXCELLENT SIR: I have the honor to acknowledge the receipt of the communication prepared by your excellency regarding the mining preparations to be made of the coal-bearing district of the valley of the river Pandan, in Cebu, together with the expediente, as transmitted by your excellency, and expressing your able opinion, in accordance with the decree of the Governor-General.

God protect your excellency many years.

Manila, October 25, 1894.

A. AVILES.

To the most excellent DIRECTOR-GENERAL OF THE TREASURY.

A copy.

ABELLA.

ROYAL ORDER TRANSMITTED BY THE DIRECTOR-GENERAL OF CIVIL ADMINISTRATION TO
THE INSPECTOR OF MINES.

MOST EXCELLENT SIR: There has been communicated to the most excellent Governor-General by the minister of the colonies, dated December 5 last, and numbered 1150, the following royal order:

“MOST EXCELLENT SIR: Having considered the communication of your excellency, No. 493, of September 29 last, in which you state the views of the general inspectorate of mines of those islands regarding the impossibility of complying with provision 4 of the royal order of July 16 of the present year relative to the preparation by the State of the coal-mining region in the valley of the river Pandan, island of Cebu, of that archipelago, and in which were proposed some measures for the carrying out of the project mentioned; having examined the royal order, bearing in mind the first provision of the said disposition, confirmed by the second provision of the same, it is ordered that the general inspector of public works of those islands be consulted respecting the probable cost of the railroad and docks proposed to be constructed; that in the second disposition of said royal order the study and plan of a list of conditions is dealt with which should be prepared by the general inspectorate of mines for the said preparation of the said coal mines while the inspectorate of public works was securing the information above mentioned; that in the third disposition is stated that before undertaking the work for the mineral preparation treated of the necessary force of employees should be secured for the work, meaning the work itself in the said preparation, and independent of the studies previously necessary to form the preliminary plan for the same; that the general inspectorate of mines could form, anticipating subsequent action, the said preliminary plan as a basis for the list of conditions, taking for this purpose all the time and gathering all the facts and information which would be deemed necessary for the object indicated without being opposed in any way nor there being established any limitation by the royal order treated of.

“Considering that the commission whose creation is proposed for this special matter can not and should not have executive authority such as that possessed by the commissions of ports, whose class and functions as administrators of funds and revenues are of a character foreign to that set forth in the proposal, and that if this commission should only have advisory functions it would be one additional proceeding in this matter, unnecessary in any way, as there exist in those islands bureaux competent to consult with in this matter; it likewise not being necessary or advisable to hasten this matter, but, on the contrary, it should be given all due consideration which its importance merits, and for this purpose the procedure is indicated and prescribed by the mining laws in force regarding the general inspectorate of mines of those islands.

“His Majesty the King, whom God protect, and in his name the Queen Regent,

has deemed it proper to decree that your excellency be instructed: That the royal order referred to of July 16 last does not prevent the general inspectorate of mines of those islands, assisted by that of public works, from attending to all the investigations and studies which are deemed necessary for the most suitable preparation possible of the list of conditions for realizing the mining concession treated of, and that said inspectorate conform with the provisions of the said order regarding all measures for carrying the realization of said project into effect, the present order to be published partly in the Gazettes of Madrid and Manila.

"I communicate this to you by royal order for your information and that the same may be duly executed."

And the said superior authority having ordered its execution by decree of this date, I transmit this to your excellency for your information and that the same may be duly executed.

God protect your excellency many years.

Manila, January 5, 1895.

A. AVILES.

To the most excellent INSPECTOR-GENERAL OF MINES.

COMMUNICATION TO GENERAL INSPECTOR OF MINES.

MOST EXCELLENT SIR: This directorate, as representing the Governor-General, on this date, on the recommendation of the general inspectorate of public works, has given the order, a copy of which I remit to your excellency, regarding the fulfillment of the provisions of the second disposition of royal order of July 16 last, relative to the survey and plans of the railroad and docks for the development of the coal deposits of the district already determined upon in Cebu.

I have the honor of communicating this to your excellency for your information and to be carried into effect.

God protect your excellency many years.

Manila, February 18, 1895.

A. AVILES.

To the most excellent INSPECTOR-GENERAL OF MINES.

RECOMMENDATION OF PUBLIC WORKS APPROVED.

No. 59.]

GENERAL DIRECTORATE OF CIVIL ADMINISTRATION, GENERAL INSPECTORATE OF PUBLIC WORKS.

MOST EXCELLENT SIR: By letter dated September 19, 1894, the general directorate of civil administration communicated with this general inspectorate of public works regarding the fulfillment of the second disposition of royal order No. 650, of July 16 of said year.

In said disposition it is ordered that this department be consulted regarding the staff employees which it could assign to the survey and preparation of plans for the railroad and docks necessary for the work planned for the purpose of developing some coal deposits in the mining region of the island of Cebu, represented on the topographical plan accompanying it, and regarding the cost of said work, the same directorate also communicating certain facts undoubtedly for the purpose of being used in said investigations.

Being ignorant of the facts which caused the decreeing of the said royal order, the inspectorate has not been able, up to the present time, to propose with sufficient certainty the most convenient plan for carrying out the provisions of that royal order.

But, having at hand the expediente drawn up at the suggestion of the able inspector of mines of the Philippines, I can appreciate the extent of the matters that will be intrusted to the department of public works in the prosecution of this work, among them being the surveys and preparation of plans and the preparation of the estimate which will show the probable cost of the railroad and docks.

Regarding the work which has to be planned and executed by the State, the estimate of expenses to be caused by the survey must be prepared for both the field work and the office work in the preparation of three copies of the plan. The department should direct the engineer in charge of public works in Cebu to investigate the conditions of that locality in conjunction with the general inspector of mines, who proposes to soon make a visit to the mines of that island, in order that by mutual agreement they fix as definitely as possible the point of commencement of the railroad, regarding the natural conditions of the locality for the location of the same, and that at the same time they agree on the facts regarding the exploitation of the mine they should also bear in mind those referring to the mining railroad and the dock.

It is also proper that the expenses of these surveys should be paid out of the credit of \$15,000 which was appropriated in article 1, chapter 5, of section 8, of the general estimates of the department of industries for the year 1894-95, for the investigation and survey of new railroads planned by the State.

Regarding the number of employees of this department who can be assigned to the said surveys and preparation of plans, this inspectorate can only state that in the department of public works of Cebu, as in other departments of the archipelago, the number of employees is very small, considering the large number of duties assigned to them; but upon the assignment of this work, as is proposed to the engineer in Cebu, the staff necessary to assist him can be selected from other persons skilled in this class of work, in the probable case that employees of the department can not be spared.

The above are the views of this inspectorate regarding the fulfillment of the dispositions of the royal order of July 16 last, contained in the second article thereof.

Submitted for your excellency's decision.

I am, most excellent sir,

CASTO OLANO.

FEBRUARY 18, 1895.

So ordered:

AVILES,

The Director-General, Representing the Governor-General.

A copy:

OLANO, *the Inspector-General.*

PROPOSAL TO SUBMIT NEW VIEWS TO MINISTRY.

MOST EXCELLENT SIR: The proposal for the preparation of the Uling and Lutac mines in Cebu, forwarded to the ministry in official communication No. 138 of April 18 last, was answered by royal order No. 650 of July 16 following, which was complied with by remitting the expediente to the treasury department and sending a copy of the dispositions referring to the department of public works to the said inspectorate thereof, and the observations of this inspectorate regarding the work intrusted to it were also forwarded to the ministry.

The treasury department wrote a comprehensive statement dated October 18, and on December 5 the ministry of the colonies deemed it proper to issue royal order No. 1150, in which it was stated that there was nothing in the royal order of July 16 last to prevent this inspectorate, assisted by that of public works, from making all the investigations and observations necessary for the preparation in as skillful a manner as possible of the list of conditions of the concession to be made, it therefore being ordered that the said royal order of July 16, 1894, be complied with.

In accordance with this order the undersigned chief requested of the zealous and able general inspector of public works the immediate fulfillment of the sovereign disposition, so many times mentioned, agreeing with him regarding the necessity of determining upon the ground, previous to taking any steps upon the definite inves-

tigation, the principal places for the railroad service which has to be constructed, with reference to the outcropping and the plan for the work to be carried on; and as the undersigned inspector thought that he should make a visit to that region for this and other purposes, the most illustrious inspector-general of public works proposed to your excellency and to the General Government the recommendation which, after being ordered complied with, has been communicated to this inspectorate with date of the 18th instant.

While the question is in this condition, and while this inspectorate with the data at its command is drawing up as rapidly as possible the list of conditions, as it has been directed, it would be well to transmit to the ministry not only the new matters of information above mentioned, but also the clear and able opinion written by the director-general of the treasury, in which it is shown that the public treasury of the Philippines can undertake this new matter and that in his judgment the project should be undertaken without too much preoccupation regarding what its realization would cost, as everything which tends to develop the public wealth is equivalent to augmenting the property taxable, and the class and probable quantity treated of can not constitute a real difficulty in the formation of the estimate in which it is consigned; because, in view of this, the ministry would then be able to consign in the next estimates of 1895-96 a sum of \$100,000, in round numbers, for example, which would make it possible to commence the work within the twelve months included therein, demonstrating by this consignment to the future concessionaries that the government intended to comply with its promises and was resolved to carry the preparation ordered into effect in the briefest time possible.

In view of these considerations this general inspectorate has the honor to propose to your excellency that this expediente be again forwarded to the most excellent governor-general in order that, if he considers it convenient, he may remit to the minister of the colonies an authorized copy of the opinion of the treasury department, and of the proposals of the general inspectorates of public works and mines which are contained therein, calling the attention of the most excellent minister of the colonies to the words and considerations of the treasurer already mentioned above.

Submitted for your excellency's decision.

Manila, February 19, 1895.

ENRIQUE ABELLA Y CASARIEGO.

FEBRUARY 20, 1895.

So ordered:

AVILES,

Director-General in Charge of the Executive Office.

[Translation of abstract of above, proposing that a certified copy of the new opinions contained in this expediente be transmitted to the ministry, calling attention above all to that of the treasury department.]

COMMUNICATION TO MINISTRY.

MANILA, February 20, 1895.

To the Most Excellent MINISTER OF THE COLONIES.

MOST EXCELLENT SIR: I have the honor to remit attached hereto to your excellency an authorized copy of the new opinions placed in the expediente for the mineral preparation of the mines of Uling and Lutac, in Cebu, by the State, calling your attention especially to that of the director-general of the treasury, in which it is manifested that the public treasury can undertake this new matter, and that in his opinion of the same it should be undertaken without too much preoccupation regarding what its realization may cost, as everything that concerns the development of the public wealth is equivalent to increasing the property taxable, and the class and

probable quantity which is treated of can not constitute a real difficulty in the formation of the estimate in which it may be consigned.

This being so, perhaps it would be convenient to consign in the estimates of 1895-96, either in the general or the local, a sum of \$100,000 in round numbers, for example, which would permit the commencement of the work after the corresponding concession is made, so demonstrating by this consignment that the government was complying with its propositions, carrying into effect the preparation projected. Upon the announcement of the concession with an amount already consigned in the estimate, the doubts and false impressions would vanish which always prevail regarding administrative delays in affairs of this nature.

God protect, etc.

I am, most excellent sir,

ABELLA.

REPORT OF DEPARTMENTS OF MINES AND PUBLIC WORKS.

On the 5th and 6th days of the month of April, 1895, with the object of complying with royal orders Nos. 650 and 1150, of July 16 and December 5, respectively, of the year 1894, and the decree of the General Government of these islands of February 18 of the present year, Mr. Enrique Abella y Casariego, general inspector of mines, and Mr. Ricardo Ayuso, chief engineer of public works of that district, met in the subdivision of Naga, of the island of Cebu, executing with common accord a hasty survey of the valley of the river Uling or Pandan, comprehended between Mount Uling, where are located the coal deposits of Uling, known for a long period of time, and the harbor of Tinaan, situated to the south of the mouth and termination of the said Pandan River, there resulting from this survey the following conclusions and agreements:

First. That the route should commence at the lower-level strip of land comprehended between the rivers Cambaji and Campacan (or Lamsub), not only on account of the necessities of the mining exploitation and the situation of the principal veins of coal, but also on account of the existence of land appropriate for the foundation of the work necessary for crossing the Cambaji;

Second. That from this point the route must follow the right margin of the river Uling, or the eastern slope of Mount Binabac until reaching the valley of Butun;

Third. That on reaching Mount Sayao the route should continue on the lowest level possible in order to facilitate the transportation of the coal from the veins of Sibod and Lutac;

Fourth. That only a detailed study of the ground can fix the line of way from the valley of Butun until the crossing of the Ug-og Creek, which empties into the valley of the Pandan, determining whether it has to be constructed following the windings of the principal river through Sayao and Lutag, or if it has to be directed through the course of the creeks Sibod, Gnindulman, and Ug-og;

Fifth. That from the Ug-og Creek it should follow down the right margin of the river Pandan until descending to Tinaan;

Sixth. That in this place the dock or docks should be situated necessary for the loading of the coal;

Seventh. That this road and the rolling stock has to be calculated to transport at least 100 tons of coal per day, and a maximum of 150 (also daily); and

Eighth. That in accordance with these conditions for the transportation it will be best that the width of the road does not exceed 60 centimeters, in order that it can be connected directly with those from the shafts, stopes, or places of washing of the coal of the mines.

And these points having been agreed upon, the present act was drawn up in duplicate in Cebu the 8th day of April, 1895.

ENRIQUE ABELLA Y CASARIEGO.
RICARDO AYUSO.

MOST ILLUSTRIOUS SIR: In compliance with the royal orders, in which was embraced and ordered the proposed preparation of the deposits of Uling, this general inspectorate has the honor to present, attached hereto, the list of conditions which must be imposed upon the concession projected.

This list having been made before the execution of the detailed and definite studies of the deposits and of the works which the State has to execute, it is clear that the amount of the cost of these works and of the time necessary for their realization is to a certain extent undetermined, or calculated without a solid basis; but this does not present great inconveniences, because, while this list is being dissented from and added to, they can proceed with the execution of the studies of a definite nature, and because even if they were completed the results obtained likewise could not be absolutely exact.

The accompanying conditions have been taken for the most part from those already indicated in the treatise drawn up by this inspectorate to propose that which is going to be realized, and therefore there is no need for further explanation. The others have been taken from other lists of conditions for analogous services of the State, judging them applicable to this case.

This list of conditions should be remitted to the general inspectorate of public works in order that it be informed and add all other conditions referring to the concession for the railroad and docks which have to be built by the State as forming part of the preparation of the mine, by which due compliance is made with the provisions of the royal order decreed regarding this matter.

Nevertheless, your excellency will decide.

Manila, October 19, 1895.

ENRIQUE ABELLA Y CASARIEGO.

OCTOBER 23, 1895.

Pass to the inspectorate of public works.

BORES.

C. DE OLANO.

LIST OF CONDITIONS FOR THE CONCESSION OF THE ULING AND LUTAC MINES IN THE VALLEY OF THE RIVER PANDAN, SUBDIVISION OF NAGA, IN CEBU, PREPARED FOR IMMEDIATE EXPLOITATION.

First. The object of the concession will be the immediate development of the Uling mines, prepared in advance, at the expense of the State, for an exploitation and transportation to the harbor of Tinaan of at least 100 tons daily, in accordance with the conditions established in this document.

Second. To this effect there will be transferred to the concessionary within a maximum period of three years after the making of the adjudication—

I. The land of Uling and Lutac, conveniently laid out in pertenencias and surveyed according to plans prepared by the general inspectorate of mines, with the buildings, workshops, bunkers, outside roads for the service, mining labors, machinery, material, and materials which will figure in the inventories and plans in detail.

II. The mining railroad for transporting a minimum amount of 100 tons daily, starting from Uling and terminating at the harbor of Tinaan, with the rolling stock, docks, buildings, workshops, which likewise will figure in the corresponding inventories and plans.

Third. The concessionary within a term of one month, counting from the day of the adjudication, should deposit in the treasury as a guarantee of the conditions of this document the sum of \$10,000 in coin, or its equivalent in Government bonds at the market quotation, it being understood that if three months are allowed to transpire without making this deposit the adjudication will be declared without effect, with the forfeiture of the security given at the time of bidding, a new award thereupon being made.

This deposit will be returned in installments in the time and manner set forth in condition 15.

Fourth. If the transfer of the mines and railroad is delayed more than three years, which is mentioned as the maximum time in the preceding condition, the Government will pay interest at the rate of 5 per cent on this deposit for all the time exceeding this period until the said transfer is made.

Fifth. Three months before the transfer of the mine the concessionary is obliged to have organized, in accordance with the code of commerce, a special company for the exploitation of these mines, registered and domiciled in Manila or in Cebu, with a minimum capital of \$100,000, two-thirds at least subscribed. To this effect notification will be given of the transfer of the mines four months in advance.

Sixth. If, as is prescribed in the preceding article, the company is not organized three months before the transfer of the mine, notification having been given, the concession will be declared canceled, with a total forfeiture of the guarantees given, which will be invested in the preservation of the interior works and all other works executed, new bids being thereupon received.

Seventh. The company, organized in the manner established by condition 5, to take the place of the first concessionary in all the obligations established in this document, without the necessity of a new contract, and for this purpose will always have a properly authorized representative to deal with the General Government of the islands.

Eighth. The company performing exploitation is obliged to accept the inventory valuation of the mines and railroad which is transferred to it, it being understood that the total value of the labor and works performed will not exceed in any case \$250,000, although a greater amount is actually invested in them; but if a less sum should be used, that will be the one which will figure in the valuations and which will be the amount of the subsequent repayment.

In these valuations amounts invested by the Government in personal staff will not be included.

Ninth. The company performing this exploitation will be obliged to pay for each ton of coal extracted the amount which it will have offered in its bid, until the repayment of the capital advanced by the State in the preparation of the mines, with interest at the rate of 5 per cent on this same capital, payable annually.

This payment to be made at the conclusion of each three months, always estimating at the least 100 tons daily, which the mines should produce as a minimum, there not being extenuating circumstances as provided for in condition No. 11.

Tenth. Until the deposits are worked out, the production can not be less than 36,000 tons of coal annually. This will be placed upon the market clean, washed and classified according to the judgment of the governmental inspector, to avoid its being discredited commercially through the coal being placed upon the market mixed with earth, slate, or noticeable quantities of pyrites, which would make it dangerous in the bunkers.

Eleventh. If extraordinary conditions should be encountered in the deposits which, through no fault of the concessionary, render very difficult or impossible the realization of the production stated in the preceding condition, the general government of the islands can modify these conditions to a certain measure, after favorable reports have been made by the official inspector in charge of the concession and by the inspector-general of mines.

Twelfth. The company is obliged to comply with all the provisions of the mining laws of these islands, and to satisfy all taxes and contributions at present in force for coal mines, and likewise will enjoy all exemptions and benefits conceded to the mining industry, provided, always, that they are not in conflict with the conditions of the present document.

Thirteenth. In addition to the inspection especially placed in charge of the con-

cession by the Government, as may be deemed convenient in manner and form, the company will organize a directing management of a mining engineer with a Spanish title for the business.

Fourteenth. To meet the expenses caused by the inspection placed in charge by the State the company will pay annually 10 cents for each ton extracted, making the payments every three months into the public treasury, which shall only be used in the service indicated.

Fifteenth. As soon as the company has repaid the capital and paid the interest for the preparation of the mines it will execute mineral labors of exploration at a greater depth below the level of the valleys, being then paid the value of those labors upon the presentation of certificates calculated by the State inspector, until the total amount is paid of the guaranty deposited upon making the bid and the adjudication of the concession.

Sixteenth. The company will always answer for the exact compliance with this contract and the provisions of the mining laws with the total value of the labors, roads, buildings, and material of all classes which the mines contain, fines to be imposed which shall not exceed \$500 for violations sufficiently proved upon the visits of inspection.

ABELLA.

COMMUNICATION FROM DEPARTMENT OF PUBLIC WORKS TO DEPARTMENT OF MINES.

MOST EXCELLENT SIR: I have the honor to return herewith to your excellency the expediente which refers to the preparation of the coal mines contained within the valley of the river Pandan, subdivision of Naga, province of Cebu, which your excellency was kind enough to remit with communication dated October 24 last, in compliance with the decree of the general directorate of civil administration of the preceding day, also inclosing a copy of the additional list of conditions which have to be imposed upon the railroad concession for the development of the said mines, and the report prepared by the chief engineer in charge of the inspectorate of railroads of these islands, with which documents this inspectorate is in complete accord, requesting your excellency to acknowledge the receipt of the expediente and the documents referred to.

God protect your excellency many years.

Manila, January 17, 1896.

CASTO OLANO.

To the Most Excellent INSPECTOR-GENERAL OF MINES.

REPORT OF INSPECTOR OF RAILROADS—PUBLIC WORKS.

No. 5.]

INSPECTORATE OF THE MANILA AND DAGUPAN RAILROAD,
CORPS OF ENGINEERS OF ROADS, CANALS, AND PORTS.

I have the honor to present to you herewith the list of special conditions which have been drawn up as supplemental to those to be imposed upon the concession of the mines and railroad of Uling and Lutac, in Cebu, in fulfillment of the order of your excellency.

This document consists only of four articles, and in them are determined the conditions which ought to control, the transfer of the works, during the exploitation, and after its termination; therefore considering all the phases of the railroad concession, but limited strictly to the works pertaining thereto. The conditions contained in the document are in accord with the laws in force for such cases in these islands or with the royal decree of August 6, 1875, and the regulations for its execution of May 24, 1878, and only differ from the list of conditions prepared by the general inspectorate of mines in the conditions regarding the transfer of the works, which transfer, I believe, in so far as it refers to the works executed by the general

inspectorate of public works, ought to be carried out in accordance with the procedure which is followed in the transfer of all public works; or, in other words, with the assistance and intervention of the two interested parties, there being modified, in so far as it affects the railroad, condition No. 8 of the document drawn up by the general inspectorate of mines, in which the concessionary is obliged to abide by the inventories prepared of the works by the administration, without any intervention on his part, a proceeding which, as I have said before, opposes the doctrine laid down for the service of public works and even with the rules of the common law.

This is all that I have to show your excellency, requesting you to be kind enough to acknowledge the receipt of the expediente of the general inspectorate of mines treated of, and which I have the honor of returning to you attached hereto for such action as you may deem proper.

God protect your excellency many years.

Manila, January 15, 1896.

ANTONIO DE LA CAMARA,
The Chief Inspecting Engineer, General Inspector of Public Works.
OLANO, *Inspector-General.*

A copy.

ADDITIONAL LIST OF SPECIAL CONDITIONS TO GOVERN THE CONCESSION OF THE MINING
RAILROAD FOR THE SERVICE OF THE COAL DEPOSITS OF ULING AND LUTAC, CEBU.

ART. 1. The works and material for the railroad will be transferred to the concessionary according to detailed plans and inventories of the same, which will be drawn up in conformity with the general measurement of the works. This measurement will be made by the engineer of roads, whom the general government will designate, in conjunction with the concessionary or his representative, and will extend to all the parts of the works open to view, but in those which are hidden the dimensions will be adopted which appear in the definite plan of the works, approved by the government. The valuation will be made by applying to the result of the measurement the prices of the project approved. The expenses caused by these operations will be to the account of the concessionary.

ART. 2. The concessionary can manage the line as he thinks proper, without further interference of the agents of the administration than those referring to conditions of police, safety, and good management of matters of public welfare.

ART. 3. The concession of the railroad is made for the time of the duration of the exploitation of the mine, although it can not exceed, in any event, ninety-nine years. Upon the ceasing of the operation of the railroad on account of the coal deposits of Uling, Lutac having been entirely worked out, and upon the declaration of this fact by the administration, the concessionary is obliged to remove all works which occupy lands of public ownership, taking the materials away in the term of one year, so that said lands remain free and in the same condition in which they were before the construction of the line; and in case it is not done in said time, the administration will execute it at the expense of the concessionary.

ART. 4. The concessionary will be obliged to comply with whatever dispositions of a general nature are dictated by the administration for railroads of its class in the Philippines, and which are not in conflict with the provisions of this document.

Manila, January 15, 1896.

ANTONIO DE LA CAMARA,
The Chief Inspecting Engineer.

There is a seal which says: "Inspectorate of railroads—Public works."

A copy.

OLANO, *The Inspector-General.*

OPINION OF THE INSPECTOR OF MINES ON THE CONDITIONS.

MOST ILLUSTRIOUS SIR: The general inspectorate of public works accepts completely the report and additional list of special conditions for the concession of the mining railroad from Uling to Tinaan, in Cebu, drawn up by the inspectorate of railroads of these islands.

This general inspectorate would not examine either that report or the consequent additional list if it were not made to appear therein that condition 8 of the document prepared by this inspectorate establishes a procedure which opposes the methods established in the service of public works, and even the rules of the common law.

In the first place, it is known that nothing opposes the common law unless it is immoral or impossible to be complied with in accordance with the law, and in that condition 8 there is nothing that is immoral or opposed to the common or special laws of the nation.

This general inspectorate also believes that the first article of the additions now drawn up is not in conformity with the opinion laid down in the first project and approved by the Government in the two royal orders which form a part of this expediente, because it does not treat here of making an appraisement of the work done, both regarding the mines and the railroad, at the time of making the transfer, but of cataloguing methodically everything then existing, at what it may have cost—that is, at its value at the termination of the work, whatever may be that value; and upon that value has to be carried out the repayment of the amounts expended by the state, and that value has to be the one which the concessionary must previously agree to, and for this purpose article 8 of the list of conditions made by this inspectorate was drawn up.

On the other hand, by the procedure adopted by the inspectorate of railroads of these islands and accepted by the general inspectorate of public works the word “valuation” is applied in the sense of appraisement, and as for every appraisement it is necessary to adopt certain types of prices (always variable) he chooses those given in the plan, with which is not obtained the real value of the works which the government will have paid for at the time of their conclusion, which is that which, as has been said, ought to be sought as the amount of repayment. No one is ignorant of the fact that there always results a great difference between the valuation of projects and that of works already carried out, and if the valuation of these results greater, as is probable, the interests of the state would be unduly prejudiced, and if the valuation results less the concessionary would be prejudiced likewise unduly, because the state does not propose to make a business proposition of this, but to lend assistance and protection to the industry, besides other views and higher considerations mentioned in this expediente.

As, according to royal order No. 650, of July 16, 1894, confirmed by the order No. 1150, of December 5 of the same year, this list of conditions has to be examined by the treasury department and the council of administration, and whatever opinion is adopted by the former or the high consultative body of these islands in accordance with their judgment this general inspectorate declares in advance that it will also espouse that opinion, because it does not believe that the details of the concession have as great importance as what has been the cause of the above explanation, for those details can be modified to meet any point of view that may be adopted without destroying the importance of the ultimate fact sought, which is no more than the establishment of an active coal-mining enterprise in these islands which would create and develop wealth not yet being exploited, assuring at the proper time the defense of the national territory of these islands.

These explanations having been prepared, it follows that this expediente should be remitted to the treasury department in order that said department may give its

able ruling in compliance with Provision IV of the said royal order of July 16, 1894.

Submitted to your excellency for decision.

Manila, January 21, 1896.

ENRIQUE ABELLA Y CASARIEGO.

JANUARY 29, 1896.

So ordered.

BORER.

THE OPINION OF THE TREASURY DEPARTMENT.

MOST EXCELLENT SIR: Having examined the expediente for the preparation of the coal mines of Uling (Cebu), and the list of conditions for their concession, drawn up by the general inspectorate of the department, as well as the additional list of special conditions which ought to control the railroad concession for the service of the coal deposits of the said mines, drawn up by the chief inspecting engineer of the Manila and Dagupan Railroad, this department finds said lists of conditions to be in accordance with the treatise prepared by the general inspectorate of mines, and the legal prescriptions governing contracts regarding public services, and in his judgment the additional list should be merged in the principal, thereby both constituting a single document, since they have an intimate relation and tend to the fixing of the corresponding conditions to which the concession of the said public service has to be subordinated, the provisions of the royal order, No. 650, of July 16, 1894, being thereby strictly complied with.

Such is the report which the undersigned has the honor to make to your excellency in fulfillment of the provisions of Article IV of the said sovereign disposition.

Manila, March 12, 1897.

GUTIERREZ DE LA VEGA.

GENERAL INSPECTORATE OF MINES OF THE PHILIPPINES, MINING DEPARTMENT.

Expediente in which J. C. Donaldson-Sim petitions for the especial concession of the mines of Uling, subdivision of Naga, in Cebu, for the realization in them of the preparation planned by the state and the consequent exploitation of at least 100 tons daily.

Commenced October 21, 1895; continued in the following year and also in the year 1897.

To the most excellent GOVERNOR-GENERAL OF THE PHILIPPINE ISLANDS.

MOST EXCELLENT SIR: Mr. J. C. Donaldson-Sim, a resident of this city, with a personal cedula of the fifth class, No. 1198, issued by the administrator of the public treasury of this province on January 17 of the present year, shows your excellency, with due respect:

That as the representative of a syndicate which desires to place in exploitation the mines of Uling, subdivision of Naga, in Cebu, he has the honor to address your excellency, petitioning you to make a special concession of these mines to the said syndicate, the company agreeing to establish the same preparation that the state promised to carry out, and then work the mines with a minimum production of a hundred tons daily, and under the other conditions that your excellency may deem proper to impose, and which your petitioner supposes will be acceptable.

Therefore he petitions your excellency that, giving the present petition due course, and reserving to the undersigned the right of priority under similar terms of concession, you may deem it proper to favor and concede what is petitioned for.

God protect your excellency many years.

Manila, October 18, 1895.

I am, sir,

J. C. DONALDSON-SIM.

Cedula duly presented.

RECOMMENDATIONS OF THE INSPECTOR-GENERAL OF MINES.

MOST ILLUSTRIOUS SIR: Mr. J. C. Donaldson-Sim, as representative, as he says, of a syndicate or company, petitions from the most excellent governor-general the especial concession of the coal deposits of Uling, upon which was to be carried into effect a preparation at the expense of the State, he promising to realize that same preparation and the consequent exploitation of at least 100 tons daily under the conditions which may be imposed upon him, and which he supposes must be acceptable.

As a matter of fact, it has already been ordered, by royal order based upon a proposition made more than a year ago by this general inspectorate, that the deposits of Uling and Lutac be prepared at the expense of the State, with the object of afterwards transferring the exploitation of the same to a private company which would repay the advancement made by the State, and comply with other special conditions, and for this purpose the admission of ordinary registrations of mines was prohibited in Cebu throughout the whole extent of the valley of the river Pandan, which comprehends those deposits, and the preliminary studies for the realization of the work already being carried on by this inspectorate and that of public works.

But the proposition was presented by this inspectorate and was accepted by the Government in view of the fact that in spite of the existence and known good quality of the coal deposits of these islands there has never been realized in them any exploitation of real importance, so that, if a private company with sufficient guarantees would offer now to carry into complete effect the plans adopted by the State, this general inspectorate is of the opinion that those offers should not be rejected, but should be investigated and accepted under such conditions as would guarantee the proper exploitation of the deposits without disturbing in any other manner the free action which that company would require for the development of its business.

The first requirement which should be guaranteed is the existence and organization of that company or syndicate, and for this purpose it would be necessary to demand of the concessionary, at present petitioning, a deposit which should not be less than the customary 2 per cent of the necessary capital for undertaking the preparation and total exploitation of the mine, and as this capital can not be less than \$350,000, the cash guarantee should amount to \$7,000.

The mining company having been organized in accordance with the code of commerce, within a period which should not exceed one year, and having been registered in Manila, with a minimum capital of \$350,000, the first deposit should be increased to 5 per cent of the capital of the company, with the object of guaranteeing in a positive manner the realization of the works of the mineral preparation; but the company can withdraw three-fourths of that deposit by proving, in the usual manner—that is, by certificates of the engineer in charge of the inspection of the mines—that they have performed labors of preparation amounting to that sum. The fourth part remaining will be applied in the same manner to guarantee the labors of exploration which the company must perform at a greater depth below the level of the valley, the company being able to perform these labors when it considers it most convenient.

The studies and labors ought to be begun when the company is organized, and for concluding the necessary preparation in order to attain the production of a hundred tons daily, it should be conceded a maximum time of three years—equal to that taken by the State—which can be extended in case the deposits present conditions which would make it impossible or very difficult to attain this minimum production of a hundred tons daily.

In order that the State can exercise the supervision and inspection necessary for the fulfillment of the conditions of this concession without burdening the estimates, it ought to demand of the company a small tax of 10 cents per ton produced, which

is very little, considering the extent of the concession and the favorable conditions under which it is made.

The *pertenencias* which form the two mining concessions of Uling and Lutac ought to form a single concession as regards the mining work, on account of the special conditions of the valley in which they are situated, for a period of at least ten years, considered to be reasonable; and they should also enjoy, while the exploitation is being carried on, the privileges which mines of coal now enjoy in this archipelago, nevertheless being subjected to the general conditions which these same concessions are obliged to comply with.

In the opinion of this inspectorate, the possibility should be foreseen, on account of war or other similar circumstance, of the Government requiring a great part of the total production of these mines, and therefore it should impose upon the company the obligation of giving to the Government that production at the price that the coal would have obtained in the market before the declaration of those extraordinary circumstances, in order to avoid the abuses which could result in such cases.

In the concession of the mines ought to be included that of the construction and operation of the mining railroad, which is indispensable for the business, but this question being outside the jurisdiction of this inspectorate this expediente should be remitted to that of public works, in order that it indicate the conditions which it thinks proper to impose upon the concessionary or the company to be substituted, bearing in mind the convenience of assisting, as far as possible, in this construction which tends in such a large measure to benefit the wealth of the country and provide for its defense.

As soon as the general inspectorate of public works has reported, this expediente should be presented to the most excellent governor-general, who is the person to whom the petition was directed in the first place, and, supposing that he agrees with what is proposed, the conditions should be communicated to the petitioner which have been adopted for the making of the concession of the mines along with the railroad and docks. If he should signify his willingness to conform with these, the expediente should be forwarded to the ministry of the colonies, since it refers to and modifies the royal orders decree for executing, at the expense of the State, the preparation of the mines in the valley of the river Pandan, which, in the meantime, should not nor can not have its proceedings and final action delayed.

In conclusion, this inspectorate thinks that, without prejudging the decision which the ministry of the colonies may take, the offer and petition made by Mr. Donaldson-Sim can be accepted, provided always that this petitioner accept, in addition to the conditions which may be imposed for the concession of the railroad and docks, those which refer exclusively to the concession of the mines, which are the following:

First. The object of the concession is the exploitation of the coal deposits of Uling and Lutac, divided by *pertenencias* into two groups in accordance with the plans of the general inspectorate of mines, and the construction and operation of the mining railroad and docks for the transportation of the coal from Uling to the harbor of Tinaan, the concessionary obligating himself to sustain a minimum of a hundred tons daily of production.

Second. In the month in which the petitioner is informed of the concession he should deposit in the treasury at Manila the 2 per cent of the minimum capital which is deemed necessary for undertaking the exploitation, or, in other words, the sum of \$7,000 in coin, or Government securities at the market quotation, in order to guarantee the organization and registration in Manila of the company which is to work the mines.

Third. Within the year in which the concession is adjudicated, as a maximum time, a company should be organized in accordance with the code of commerce, and registered in Manila, with a minimum capital of \$350,000, thereupon increasing the

guarantee of the first concessionary to complete the 5 per cent of that capital, or, in other words, the amount of \$17,500. Thereupon the demarcation should be made of the mines in accordance with the law then formulating the concession of the mines.

Fourth. If the preceding condition is not complied with the first concessionary will forfeit the amount of his guaranty of 2 per cent.

Fifth. The investigations which the State will have performed and the works of exploration which will have been carried on will remain the property of the company upon its organization.

Sixth. The deposit of the 5 per cent made by the company can be recovered up to 75 per cent of its value, in proportion to the amount of the certificates issued by the engineer in charge of the inspection of the mines, in which the value is stated of the labors of preparation which have been carried on. The 25 per cent remaining will be applied in the same manner to the valuations of the works of investigation below the level of the valleys, which the company can carry on when it considers it most convenient.

Seventh. The works of preparation, in order to attain a minimum production of coal of 100 tons daily, including the construction of a mining railroad, shall be completed within the maximum term of three years after the organization of the company, unless there are presented in the deposits extraordinary conditions which make the attainment of this production very difficult or impossible, in which case the governor-general can alter or modify it, after favorable reports have been made by the engineer in charge of the inspection of the mines and the general inspector of the department.

Eighth. The company is obliged to comply with the provisions of the mining laws which are not contrary to these conditions, and likewise can enjoy the benefits now granted to other coal mines, it also being understood that there can not be imposed on this concession, during its existence, new taxes or obligations.

Ninth. In order to meet the expenses caused by the supervising inspection of the mines, the company will pay 10 cents for each ton extracted, and these payments, which will only be expended for the object indicated, shall be paid into the public treasury at the expiration of every three months.

These payments will not release the company from having in the mines the supervising inspection which is now demanded from all coal mines in these islands.

Tenth. Although the concession of Uling and Lutac are separate, they will be considered as joining one another as regards the force of laborers required, they being permitted to concentrate the work exclusively in Uling until the company deems it proper to develop the veins of Lutac. Nevertheless, if in the term of ten years after the organization of the company no labor has been performed in exploiting the Lutac mines, this group of pertenencias will be considered canceled, and the Government can concede it to anyone petitioning for it.

Eleventh. If, on account of war or other extraordinary like circumstance, the Government requires either partially or entirely the coal which this concession produces, the company is obliged to deliver the same to it at the price which would have been obtained in the market before the declaration of those extraordinary circumstances occurred.

Submitted for your excellency's decision.

Manila, October 22, 1895.

ENRIQUE ABELLA v CASARIEGO.

Pass this to the inspectorate of public works, in order that it report as soon as possible upon the subject regarding the matters in which its opinion is required.

October 23, 1895.

BORES.

GENERAL INSPECTORATE OF MINES OF THE PHILIPPINES.

MOST EXCELLENT SIR: I have the honor to remit herewith the expediente which refers to the preparation of the coal mine contained in the valley of the river Pandan, subdivision of Naga, province of Cebu, in compliance with the decree of the general directorate of civil administration, dated yesterday, which is contained therein.

God protect your excellency many years.

Manila, October 24, 1895.

ENRIQUE ABELLA Y CASARIEGO.

To the most illustrious INSPECTOR-GENERAL OF PUBLIC WORKS.

A copy.

ABELLA.

ACKNOWLEDGING RECEIPT OF ABOVE.

MOST EXCELLENT SIR: This general inspectorate having been sufficiently informed, I have the honor to return to your excellency the expediente prepared at the instance of Mr. J. C. Donaldson-Sim for the concession of the mines of Uling, subdivision of Naga, province of Cebu.

God protect your excellency many years.

Manila, November 23, 1895.

CASTO OLANO.

To the most excellent INSPECTOR-GENERAL OF MINES.

COMMUNICATION FROM INSPECTOR-GENERAL OF PUBLIC WORKS.

MOST ILLUSTRIOUS SIR: In accordance with information contained in the expediente which was given due course at the instance of Mr. J. C. Donaldson-Sim, in petitioning for the special concession of the mines of Uling, subdivision of Naga, province of Cebu, which the general inspectorate of mines remitted to me in compliance with the order of your excellency upon the matter, dated October 23 last, I have the honor of forwarding herewith to your hands a copy of the report made in this matter by the engineer of this general inspectorate of public works of the railroads of the Philippines, with which document I am in complete accord, and attached thereto I return to your excellency the said expediente through the said general inspectorate of mines.

God protect your excellency many years.

Manila, November 23, 1895.

CASTO OLANO.

To the most illustrious DIRECTOR-GENERAL OF CIVIL ADMINISTRATION.

No. 145.]

PUBLIC WORKS, INSPECTORATE OF THE

MANILA AND DAGUPAN RAILROAD,

CORPS OF ENGINEERS OF ROADS, CANALS, AND PORTS.

Your excellency has been pleased to remit, for the information of this inspectorate, a petition which Mr. J. C. Donaldson-Sim presented to the most excellent Governor-General of these islands, soliciting the especial concession of the mines of Uling, subdivision of Naga, in Cebu, in order to realize the preparation planned by the State and the consequent exploitation of a hundred tons daily at least.

The opinion of this inspectorate is requested regarding the conditions in which the concession of the mining railroad could be made, which is considered necessary to construct for the convenient exploitation of these mines, and in this regard we will show that the legislation in force in these islands, to which all concessions of railroads must be subjected, is contained in the royal decree of August 6, 1875, dictating the general basis for railroad legislation in the Philippines, and the regulations for the execution of the law of railroads of the peninsula of May 24, 1878, which likewise controls in the execution of that decree, by virtue of what is provided in article 1 of the additions to the same. Therefore, as the railroad treated of is not destined

to be of general use, but for that of a private enterprise, and in its consideration is to occupy lands belonging to the State, the concession should be made in accordance with articles 72, 73, and 74 of the said regulations, but it should nevertheless be noted that, although this railroad may be intended for the development of a private industry, it can perhaps be considered as of general interest, and it appears that it is so considered by the general inspector of mines in the expediente drawn up for the purpose of the State preparing the labors of this same mineral deposit, and make possible the exploitation thereof. Upon this supposition, and if the Government declares the construction of this line to be of public benefit on account of being for the development of some deposits of a general interest, the concession should be authorized in accordance with the proceedings and conditions given in articles 13, 14, and 15 of the said royal decree of August 6, 1875, and articles 75, 76, and 77 of the regulations of May 24, 1878, and with the privileges and exemptions given in article 17 of the same royal decree. In either case, the concession of the line should be made for the time only during which continues the exploitation of the mine with which it connects, and in case of the exhaustion of the deposits, and upon the declaration of that fact by the administration, the concessionary, at his own expense, will have to tear down all the structures which he has placed on public lands, also removing the materials, so that the lands shall remain vacant and in the same condition in which they were before the granting of the concession.

In summing up, and as an abstract of what has been said, it is the understanding of the official making this report that in case the Government considers it convenient to accede to what the petitioner requests and to concede the exploitation of the mines of Uling, it can execute at the same time the concession of the railroad necessary to serve these mines, under the following conditions:

First. The petitioner will be granted a period of six months in which to present the general plan of the line, or the preliminary plan, in accordance with the method approved by royal order of June 7, 1876, in case this line shall be declared of public benefit; and in case this declaration is not made, he shall present the plan of the same, according to the requirements stated in article 72 of the regulations for the execution of the law of railroads of May 24, 1878.

Second. Upon the approval of the plan, or preliminary plan, referred to in the preceding condition, and before commencing the work, the concessionary should deposit as a bond or guarantee a sum equivalent to 5 per cent of the total value of the line in case it should be declared of public benefit, and only 5 per cent of the estimated value of structures occupying public property in the case that declaration is not made. This guarantee will be returned to the concessionary upon his showing that he has satisfied the terms of the contract.

Third. The inspection and supervision of the construction will be executed by the functionary or functionaries of the general inspectorate of public works whom the Governor-General may designate, and the expenses occasioned thereby will be charged to the concessionary. This intervention of administrative agents will only be exercised regarding work affecting public property if the concession is declared not to be of public benefit, and will be exercised over all work on the line if this declaration is made.

Fourth. Upon the conclusion of the work the concessionary can operate the line as he considers proper, without further intervention of the administrative agents than refers to the conditions of safety, police, and good management of affairs of public interest.

Fifth. This concession will be granted for the period of time when the exploitation of the mine is being carried on, although it never can exceed ninety-nine years. In the event of the operation of the railroad ceasing on account of the exhaustion of the deposits of Uling, and upon the declaration of the same by the administration, the concessionary is obliged to tear down all the structures which occupy public lands,

removing the materials therefrom within the term of one year, so that the lands shall remain vacant and in the same condition in which they were before the granting of the concession, and in case that this is not carried out in said time the administration will perform this labor at the expense of the concessionary.

Sixth. The work on this line should be begun in a period of six months, counting from the approval of the plan, and should be finished in the time to be stated in the conditions given therein, except in the case of fuerza mayor, properly proved.

Seventh. This concession will lapse upon the concessionary failing to comply with any of the terms of the concession, in which case he will lose the guaranty given and the lands ceded will again form a part of the public domain.

Eighth. The concession is granted subject to the provisions of the royal decree of August 6, 1875, and the regulations for its execution, of May 27, 1878, in so far as applicable; the concessionary also being subject to whatever dispositions of a general nature are decreed by the administration for railroads of its class in the Philippines which are not contrary to the provisions of this document.

The above is what I consider best to report regarding the expediente treated of, which I herewith have the honor of returning to your excellency.

God protect your excellency many years.

Manila, November 21, 1895.

ANTONIO DE LA CAMARA,
Chief Inspecting Engineer.

To the INSPECTOR-GENERAL OF PUBLIC WORKS.

A copy.

OLANO, *the Inspector-General.*

RECOMMENDATIONS OF INSPECTORATE OF MINES AND DECREE THEREON, ETC.

MOST ILLUSTRIOUS SIR: The general inspectorate of public works on the 23d of this month remitted the report by the inspector of the Manila and Dagupan Railroad, with which it completely concurs. In that report the inspector of the railroad makes note of the fact that the law in force in the Philippines is the royal decree of August 6, 1875, and the regulations for the execution of the law of railroads of the peninsula, of May 24, 1878, which is in force likewise in the Philippines by virtue of article 1 of the additions to that royal decree; and as a consequence of these dispositions and the idea contained in his report eight conditions are established, to be applied in case the Government decides that it can concede to the petitioner the concession of the railroad at the same time as that of the mine.

Such being the case, it follows that the matter should be placed before the most excellent governor-general, proposing to him:

First. That the interested party be notified of the conditions indicated by this general inspectorate, and by that of public works for the concession of the mine and the railroad which has to connect them with the harbor of Tinaan, in order that he may show in writing if he agrees to them, or that he may set forth any modifications that he may consider proper; and,

Second. That upon the compliance with this requirement an authorized copy of this expediente be remitted to the minister of the colonies, in order that he may decide what he considers best in accordance with the information in his possession, and that in the meantime the proceedings and studies be continued regarding the expediente for the preparation, at the expense of the State, of the mines of Uling, the especial concession of which is now petitioned as that proceeding and those studies are ordered executed by royal order. Submitted for your excellency's decision.

Manila, November 25, 1895.

ENRIQUE ABELLA Y CASARIEGO.

NOVEMBER 28, 1895.

MOST EXCELLENT SIR: The directorate so orders.
So ordered.

J. BORES Y ROMERO.

[Translation of abstract reporting upon the petition of Mr. Donaldson-Sim and the conditions indicated by the inspectorates of mines and public works, and proposing that the interested party be notified before remitting the expediente to the ministry of the colonies.]

On this date, being previously notified, Mr. J. C. Donaldson-Sim presented himself in this general inspectorate in order to be informed of the above decree and of the conditions indicated by the general inspectorates of public works and mines, in proof of which he signs below.

Manila, December 2, 1895.

ENRIQUE ABELLA Y CASARIEGO.
J. C. DONALDSON-SIM.

COMMUNICATION FROM J. C. DONALDSON-SIM REGARDING DECREE.

To the Most Excellent GOVERNOR-GENERAL OF THE PHILIPPINE ISLANDS.

MOST EXCELLENT SIR: Mr. J. C. Donaldson-Sim, a resident of this city, with a personal cedula of the fifth class, No. 1198, issued by the administrator of the treasury of this province, January 17 of the present year, shows to your excellency, with due respect:

That your petitioner, having examined with great care the conditions which the general inspectorates of mines and public works have submitted as necessary for the Spanish Government to concede what has been petitioned for regarding the mines of Uling, in Cebu, concurs with the greater part of them, except those which I shall hereafter express to your excellency.

In the third condition of those submitted by the inspectorate-general of mines is demanded the deposit of 5 per cent of the amount of capital necessary for the exploitation, including in that capital that which is necessary for the construction of the mining railroad from Uling to Tinaan; therefore with that deposit ought to be satisfied that which the inspectorate-general of public works indicates in its second condition. This second condition should therefore be dropped, it being covered by the third of the conditions of the mining department to which it belongs, it being expressed therein that the mining railroad be declared of public benefit.

In the same manner the sixth condition of mines ought to be merged in the same second condition of public works, it clearly appearing that the cash guaranty corresponding to the public works ought to be satisfied completely upon the construction of the mining railroad. Likewise, there should be added to this sixth condition of mines, "If it were possible, in the judgment of the officials of the Government."

As the third condition of mines gives one year's time for the organization of the company after the making of the concession, with the deposit of 2 per cent of the total capital, it will be necessary that this same maximum period of one year be granted for the presentation of the survey of the mining railroad, instead of the six months established in the first condition of public works.

Likewise the clear interpretation of condition 11 of mines appears doubtful to the petitioner regarding the fixing of the price of coal before the declaration of war or extraordinary circumstances which are therein mentioned, and it is necessary that it be expressed if that price is the one that coal would have immediately before or one week before the official declaration of those extraordinary circumstances.

Having made the slight modifications and alterations, the petitioner accepts the conditions indicated by the general inspectorates of mines and public works, hoping that in accordance with your judgment you may deem it proper to influence the decision of the Government regarding the concession which the petitioner has solicited.

God protect your excellency many years.

Manila, December 4, 1895.

I am, excellent sir,

J. C. DONALDSON-SIM.

COMMUNICATION TO MINISTER OF THE COLONIES.

MANILA, *December 31, 1895.*

To the Most Excellent MINISTER OF THE COLONIES.

MOST EXCELLENT SIR: In order that your excellency may adopt whatever resolution you consider most appropriate, I have the honor to forward to your hands the annexed authorized copy of the expediente drawn up on account of the petition made by Mr. J. C. Donaldson-Sim, for the realization, in the name of a company, of the preparation of the mines of Uling, which the state was beginning to execute, and its subsequent exploitation.

In the meantime the regular proceedings and the official investigations for the preparation of the said mines of Uling will continue their regular course, since they were ordered carried out by royal order.

God protect, etc.

I am, most excellent sir,

ABELLA.

ROYAL ORDER OF MAY 31, 1896, AND DECREE THEREON.

MOST EXCELLENT SIR: There was communicated by the minister of the colonies, with the date of May 31 last and number 575, to the most excellent governor-general the following royal order:

“MOST EXCELLENT SIR: The expediente having been formulated in those islands concerning the petition of Mr. J. C. Donaldson-Sim for the realization in the name of a company of the preparation of the coal mines in Cebu, in that archipelago, which preparation has been ordered executed by the state in fulfillment of the provisions of royal order of July 16, 1894, favorable reports having been made upon said petition by the general inspectors of public works (and mines) of those islands, and conditions having been proposed by them, respectively, for the concession of the said mines and for the railroad necessary for their development, regarding which your excellency reports in his communications of the 18th and 31st of December last, and having consulted the superior commission of mines, which is likewise favorable to this petition; considering that the proposition contained in the royal order of July 16, 1894, above cited, was that of aiding and making possible under good conditions the exploitation of the coal deposits of the valley of the river Pandan, in the island of Cebu, having seen the uselessness of the attempts made up to the present time to carry out the said exploitation; but upon a private enterprise offering itself with sufficient capital and guarantees for the realization of said mining preparation, relieving the state from the obligations contracted, it will be convenient for such proposition to be carried into effect by said private enterprise, provided that upon the granting of the concession all measures be adopted necessary to completely guarantee the interests of the state.

“Regarding the petition of J. C. Donaldson-Sim, although his proposition is acceptable, it will be advisable to refrain from any action of a definite nature regarding the guarantees to be determined upon until a notice calling for bids has been published in these islands, in order to ascertain if there are others who will offer better terms and guarantees for such development under said conditions; and treating of a concession of an especial character, of a privilege of exploitation, the formation of the list of conditions prepared by the general inspectorates of mines and public works should be ordered and approved by that general government, in subjection to which conditions, and after the said public bidding, your excellency can concede the said mining preparation and the railroad necessary for its subsequent exploitation. His Majesty the King, whom God protect, and in his name the Queen Regent, has deemed it proper to decree: that the list of conditions be prepared by the above mentioned departments of those islands, for the placing of the concession of the preparatory works on the mines treated of before the public for bids thereon, authoriz-

ing your excellency to thereupon grant the especial concession, to which the corresponding expediente refers, an extract of this resolution being published in the Gazette of Madrid, and in its entirety in that of Manila, and your excellency being informed of what action to take in the matter.

"I inform your excellency of this by royal order, for your information and to be carried into effect."

And the above-mentioned superior authority having ordered the fulfillment of the provisions of this order, by a decree of this date, I transmit it to your excellency for your information and to be carried into effect.

God protect your excellency many years.

Manila, July 8, 1896.

J. BORES.

To the Most Excellent INSPECTOR GENERAL OF MINES.

GENERAL DIRECTORATE OF CIVIL ADMINISTRATION.

MOST EXCELLENT AND ILLUSTRIOUS SIR: With date of January 29 of the present year, I had the honor of remitting to your excellency the expediente formed for the preparation of the mines of Uling, in compliance with a provision of the royal order No. 650, of July 16, 1894, but it being necessary to have it at hand now for the compliance with the royal order No. 575, of May 31 last, I request your excellency for its return in the shortest period of time possible.

God protect your excellency many years.

Manila, November 11, 1896.

J. BORES.

To the Most Excellent and Illustrious DIRECTOR-GENERAL OF THE TREASURY.
A copy.

ABELLA.

GENERAL DIRECTORATE OF CIVIL ADMINISTRATION.

MOST EXCELLENT AND ILLUSTRIOUS SIR: On the 11th of November last, I had the honor of addressing to your excellency the following:

"MOST EXCELLENT AND ILLUSTRIOUS SIR: With date of January 29 of the present year, I had the honor of remitting to your excellency the expediente formed for the preparation of the mines of Uling, in compliance with a provision of the royal order No. 650, of July 16, 1894, but it being necessary to have it at hand now for the compliance with the royal order No. 575, of May 31 last, I request your excellency for its return in the shortest period of time possible."

And this being a matter of an urgent character, I renew the above request of your excellency.

God protect your excellency many years.

Manila, December 9, 1896.

J. BORES.

To the Most Excellent and Illustrious DIRECTOR-GENERAL OF THE TREASURY.
A copy.

ABELLA.

GENERAL DIRECTORATE OF CIVIL ADMINISTRATION.

MOST EXCELLENT AND ILLUSTRIOUS SIR: With date of November 11 of the year last past, I had the honor of requesting of your excellency the return, in the shortest period of time possible, of the expediente formed for the preparation of the mines of Uling, with the object of complying with the provisions contained in royal order No. 575, of May 31, 1896, to which communication your excellency answered, with date of December 15 last past, that you would remit it as soon as the consulting committee of the intendencia under your able supervision submitted its report. As the

matter is of an urgent nature, and as the said expediente has not yet been returned, I take the liberty of reminding your excellency of the urgency of its remission, in order that, if you deem it proper, you may order that the said consulting committee submit its report as soon as possible, with the object of complying as soon as possible with the object stated in the important royal order above mentioned for the benefit of the interests of the state, of which your excellency is so faithful a guardian.

God protect your excellency many years.

Manila, January 26, 1897.

J. BORES.

To the Most Excellent and Illustrious DIRECTOR-GENERAL OF THE TREASURY.

A copy.

ABELLA.

LIST OF CONDITIONS.

First. The object of this special concession is the regular exploitation of the coal deposits of Uling and Lutac, with the plan of a minimum production of 36,000 tons annually, executing for this purpose the necessary mining labors and the construction of a railroad from Uling to the harbor of Tinaan, with a dock or docks for loading and unloading in this harbor.

Second. The concessionary is obliged to deliver in Tinaan all orders for coal which may be made upon him, in order to provide for the normal necessities in the Philippines, until the amount reaches one-half of the annual production, at the price which that combustible realizes in the market, with a rebate per ton which the concessionary himself will fix and which will constitute the object of the bidding.

Third. In order that any bid may receive consideration it will be necessary that a deposit be made in the treasury of Manila of 2 per cent (\$7,000) of the capital which is considered necessary to carry that exploitation to a conclusion under the conditions established in this document.

Fourth. Before the expiration of a year after the adjudication of the concession a special company will be organized and registered in Manila in accordance with the code of commerce, which company has to carry out the preparation and exploitation of the mines, with a minimum capital of \$350,000, at least two-thirds of which is subscribed, and this company, without the necessity of a new contract, is obliged to take the place of the first concessionary in all the obligations established by this document, it being obliged to appoint for this purpose an authorized representative at the seat of the General Government.

Fifth. At the same time that the company is organized the concessionary will be obliged to show—

1. That the plan has been presented in accordance with the rules approved by royal order of June 7, 1876, or a preliminary plan in lieu thereof of the mining railroad from Uling to Tinaan, with the docks for loading at that point, the whole work being considered as of public benefit.

2. That it has increased the deposit it made upon presenting its bid, to complete the 5 per cent (\$17,500) of the minimum capital of the company, which will serve as a guaranty for the compliance with the provisions of this document until it is returned in the manner established by condition 11; this guaranty being deposited in the treasury of Manila, either in coin or its equivalent, in public securities at the market quotations, or in notes of the treasury itself.

Sixth. If conditions 4 and 5 are not complied with within the time mentioned therein, the concessionary will forfeit the amount of his guaranty on presenting his bid, without the right to any reclamation.

Seventh. Upon the proving of the fulfillment of the conditions 4 and 5 in full the demarcation and survey of the mines of Uling and Lutac will be commenced and

carried out, they being laid out in accordance with the boundaries stated in the plans prepared by the general inspectorate of mines; but those limits can be varied on the petition of the company, provided that the engineer in charge of the demarcation and the general inspectorate of the department believe it necessary for the development of the outcroppings which have been discovered within the valley of Uling.

Eighth. The works for the preparation of the mine, to place them in the condition ready to produce regularly the hundred tons daily established as a minimum in this document, will be commenced six months after the first inspection for the demarcation, and must be completed before the expiration of three years from that same date.

In the same manner the work upon the railroad must be commenced six months after the approval of the plan, and must be completed before the expiration of three years after the commencement of those works.

Ninth. The preceding condition can be modified in case of "fuerza mayor," properly proved; but if the company fails to comply with it without a sufficient reason it will lose its guaranty, the concession being declared canceled.

Tenth. If in executing the preparatory works on the mines there are presented in the deposits conditions of such a nature as to make it impossible or very difficult to attain the minimum production established in this document, the governor-general can modify it in conformity with the decisions of the engineer in charge of the inspection of the mines and the general inspectorate of the department.

Eleventh. Upon the completion and the approval of the railroad and docks at Tinaan there will be returned to the company the 5 per cent of the value of the works stated in the plan, returning the value of the deposit as a guaranty as established in paragraph 2 of condition 5 of this document.

The remainder of the guaranty likewise will be returned to the company until completely repaid, returning to them successively the amounts of the certificates of valuation made annually concerning the preparatory labors which should be carried on after the commencement of the exploitation, these certificates having been issued by the engineer in charge of the inspection of the mines.

Twelfth. The inspection and supervision of the works on the railroads and docks will be in charge of the functionary or functionaries of the general inspectorate of public works whom the General Government may designate, and the expenses occasioned thereby will be charged against the account of the concessionary.

Thirteenth. The company can operate the line as it thinks proper, without greater interference by the administrative agents than that referring to conditions of safety, police, and the good management of public affairs.

Fourteenth. The concession of the railroad is executed in accordance with the provisions of the royal decree of August 6, 1875, and the regulations for its execution of May 24, 1878, in so far as applicable, for the time during which the mine is being exploited, although it can in no event exceed ninety-nine years; and once finished, the company is obliged to tear down all the works occupying public property, removing the materials within the term of one year, so that those lands will remain as they were before the granting of the concession, and in case it is not done in said time the administration will do it at the expense of the concessionary.

Fifteenth. The company is obliged to comply with the provisions of the mining law now in force, which is not contrary to the conditions of this document, and it will likewise enjoy the benefits which coal mines now enjoy or may enjoy in the future, without it being possible to impose on this new especial concession, during its existence, new taxes or burdens.

Sixteenth. The coal which these mines may produce will be placed on the market very clean, washed, and classified according to the judgment of the governmental

official in charge, in order to avoid its being discredited in commerce in case it should be sold mixed with earth, slate, or perceptible quantities of pyrites, which would make it dangerous in bunkers.

Seventeenth. In order to cover the expenses occasioned by the inspection of the Government, the company will pay 15 cents for each ton extracted, placing the amount of this payment, which will only be used for this purpose, in the public treasury in Manila or Cebu.

These payments will not exempt the company from having in the mines the governmental overseer which to-day is demanded in all coal mines in these islands.

Eighteenth. Although the concessions of Uling and Lutac are separated, they will be supposed to be together for all legal purposes, they being able to concentrate all the work exclusively at Uling until the company is ready to attack the veins of Lutac. Nevertheless, if at the end of ten years after the formation of the company no work has been done at Lutac, this group of claims will be considered canceled, and the State can concede it to anyone who petitions for it.

Nineteenth. If on account of war or other similar extraordinary circumstance the government requires the entire production of these mines, the company is obliged to grant it at the price which the coal brought one month before the conflict, with the corresponding rebate offered in the bid.

Manila, June 12, 1897.

CASTO OLANO,

General Inspector of Public Works.

ENRIQUE ABELLA Y CASARIEGO,

General Inspector of Mines, Filipinas.

MOST ILLUSTRIOUS SIR: The royal order No. 575, of May 31, 1896, orders that there be formed by this general inspectorate and that of public works a definite list of conditions destined to bring about a public bidding for the concession of the preparatory works and exploitation of the mines of Uling and Lutac.

When this royal order was communicated to this general inspectorate, all of the few members of its staff were engaged in field operations appertaining to the department, and when they returned to this city and attempted to take up this very important matter, the said events which then began to occur in this archipelago made that work slightly inopportune, since the circumstances were not the most adequate for undertaking industrial enterprises in these islands, and a failure would have been obtained at the bidding. Besides, in order to proceed with all the facts at hand regarding the matter, it was necessary to possess the expediente on the preparation of the mines of Uling and Lutac; and that expediente was in the treasury department, pending a report regarding the other lists of conditions prepared on the supposition that those mines would be prepared by the State. That expediente was requested of the treasury in the beginning of the month of November last; it was again requested in the month of December, and at the end of January, both last past, and it having been at length returned and the aspect of the question of public order now being changed, this inspectorate has the honor to present herewith the plan of the list of definite conditions for the bidding ordered made by the royal order of May 31 of the preceding year.

For its preparation the only difficulty presented was that of seeking a motive for the bidding which did not exist in the former conditions, as in this expediente there is only treated the imposition of some conditions upon a proposition presented by Mr. J. C. Donaldson-Sim, and in the beginning it was supposed that the State would carry out the preparation, and the motive of the bidding was the amount of money to be repaid of the capital used by the State. This inspectorate believes it has found

that motive for the bidding desired, by imposing on the concessionary the just and reasonable condition of ceding to the State, if it should require it, the one-half of the production of the mines, at the market price, with a rebate per ton to be fixed by the bidder himself. This rebate constitutes, therefore, the amount to be bid upon.

The other conditions, with slight modifications, are the repetition of those already drawn up by this inspectorate and that of public works, including all of them in the same document, as we are only dealing with a single concession.

These conditions should be remitted to the general inspectorate of public works, in fulfillment of the royal order, already cited, of May 31 of last year, sending with it the first expediente concerning the preparation of the mines, in order that they may have at hand all the facts regarding the matter.

Submitted for your excellency's decision.

Manila, May 18, 1897.

ENRIQUE ABELLA Y CASARIEGO.

JUNE 2, 1897.

So ordered.

BORES.

MOST EXCELLENT SIR: Conforming with the list of conditions prepared by the general inspectorate under your able supervision, in accordance with which conditions there shall be held public biddings for the concession of the preparatory works regarding the exploitation of the coal mines of Uling, in Cebu, and the mining railroad for the exploitation of the same, and the said document having been signed by the undersigned inspector, I have the honor of returning to your excellency the expediente relative to this matter which you had the kindness to remit to me with your communication of the 3d instant.

God protect your excellency many years.

Manila, June 12, 1897.

CASTO OLANO.

To the Most Excellent INSPECTOR-GENERAL OF MINES.

MOST EXCELLENT SIR: In connection with the carrying on of the investigations for the preparation of the coal deposits of Uling and Lutac at the expense of the state, there was presented a proposition to carry out that same preparation and the subsequent exploitation subscribed by one Mr. Donaldson-Sim, who said he was the representative of a foreign company.

This expediente having undergone the usual course of proceeding and having been remitted for the decision of the ministry of the colonies, the superior ministry dictated the royal order No. 575, dated May 31, 1896, ordering that the general inspectorates of public works and mines should prepare a list of conditions for bringing about a public bidding regarding the preparation and exploitation of the said mines, authorizing your excellency to afterwards grant it, reporting to the ministry.

As, in order to prepare the list of conditions of the concession planned, it was necessary to have at hand the original expediente in which had been proposed to the Government the preparation of the mines, this was requested of the treasury department, where it had been sent to secure a report required by royal order, the document being secured only after three successive letters to remind that department.

With this expediente at hand, this general inspectorate prepared the list of special conditions to which this special concession has to be subjected, the general inspectorate of public works agreeing to it, as appears in this expediente, through the com-

munication attached thereto and through the signature placed on the same by the most illustrious general inspector of that department.

If your excellency should deem it proper to approve that list of conditions, it follows that the notice for bids should be published in the manner shown in the plan of the decree, which the undersigned has the honor to present herewith to your excellency.

Submitted for your excellency's decision.

Manila, June 25, 1897.

I am, most excellent sir,

ENRIQUE ARELLA Y CASARIEGO.

JULY 3, 1897.

The directorate approves.

J. BORES Y ROMERO.

So ordered.

MANILA, *July 8, 1897.*

In fulfillment of royal order No. 575, of May 31, 1896, and in conformity with the proposal of the general inspectorates of mines and public works and the general directorate of civil administration, I have deemed it proper to decree the following:

First. A public bidding is to be held for the special concession of the groups of coal mines of Uling and Lutac, situated in the subdivision of Naga, of the island of Cebu.

Second. The attached list of special conditions is approved regarding this concession, and, in accordance with the provisions thereof, will be executed the works of preparation of the mines, the construction of the railroad, and the exploitation of the deposits.

Third. The bidding will be held six months after the publishing of this decree in the Gazette of Manila—that is, on the same day of the month of January, 1898, at 12 o'clock a m.—in the hall of public acts, in the building known as the former custom-house, before the royal commissioners selected in the manner provided for these cases by royal order No. 320, of April 18, 1897.

Fourth. At the general inspectorate of mines will be found at the disposition of those who desire to take part in the bidding, the plans and technical data regarding the mines, together with the original list of conditions approved by the present decree.

Fifth. The bidding will be conducted in accordance with the provisions relative to public sales contained in royal order of February 27, 1852, extended to the colonies by royal order of September 29, 1856; therefore the propositions must be presented in sealed documents in strict conformity with the annexed model, and accompanied by the document showing that the deposit in the treasury has been made of the guarantee of \$7,000 in money, certificates of money deposit in the same governmental treasury department, or bonds of the State at the market quotations, according to condition third of the list of conditions.

Sixth. The bidding will concern the rebate, which must be made in the price of the combustible which the State may require in accordance with the second condition of the list of conditions. If there should result one or more propositions equal, with the best terms, there will be proceeded with immediately, and only between those proposing these terms, a new reception of bids in accordance with the instructions of March 18, 1852.

P. DE RIVERA.

MODEL OF THE PROPOSITION.

Mr. John Doe, resident of ———, being informed of the decree calling for bids, published in the "Gazette of Manila" of (date) ———, and of the list of conditions which accompany it, for the concession by public sale of the mines of Uling and Lutac, situated in the subdivision of Naga, province of Cebu, obligates himself to undertake the said concession in strict accordance with the conditions thereof, and agreeing in accordance therewith to deliver at Tinaan the coal required by the State until the amount reaches the one-half of the production of the mines, at the market price of similar coals, with the rebate of ——— per ton.

Date and signature in full of the bidder.

GENERAL INSPECTORATE OF MINES OF THE PHILIPPINES.

MOST ILLUSTRIOUS SIR: I have the pleasure of remitting to you herewith 16 pages, certified, for publication in the Gazette under your able direction, requesting that it be placed in a preferable place on account of the importance of the matter treated of. God protect you many years.

Manila, July 19, 1897.

ENRIQUE ABELLA Y CASARIEGO.

To the Most Illustrious DIRECTOR OF THE GAZETTE OF MANILA, and SECRETARY OF THE GOVERNOR-GENERAL.

A copy.

ABELLA.

The advertisement and the conditions attached to the concession, already translated on pages 62, 63, 64, and 67 hereof, were published in the Manila Gazette of July 22, 1897. Owing to an error in the fourth condition of the list, stating that the minimum capital should be \$35,000 instead of \$350,000, as published in the Gazette of July 22, the list of conditions, with the said error corrected, were again published in the Gazette of July 24.

MANILA, *July 22, 1897.*

To the Most Excellent MINISTER OF THE COLONIES.

MOST EXCELLENT SIR: In fulfillment of royal order No. 575, of May 31, 1896, the general inspectorate of mines prepared the list of conditions for the reception of bids for the preparation and exploitation of the coal deposits of Uling and Lutac, and the general inspectorate of public works agreeing entirely with that list of conditions, with date of the 8th of the present month I approved the said list, the decree advertising the sale and the said list being published in the Gazette of this city of the 22d and 24th instants, in which your excellency can examine them. The apparent delay caused in this matter is due principally to the unfortunate events occurring in this archipelago, which commenced precisely upon the arrival of the royal decree above mentioned, making the time inappropriate for any bidding upon an industrial enterprise such as that treated of.

God, etc., most excellent sir.

(Draft.)

L. (Initial of Luis Espina.)

GENERAL DIRECTORATE OF CIVIL ADMINISTRATION, MINES.

MOST EXCELLENT SIR: In order to comply with royal order No. 575, of May 31, 1896, and with the object of being able to hold the public sale announced by superior decree of the most excellent governor-general, dated July 8, 1897, published in the Gazette of Manila on the 22d and 24th of the same month and year; and that the royal commission in charge of the sale may be called together, over which your

excellency is the able president, I have the honor of passing to your excellency the original expediente drawn up for the special meeting concerning the public sale of the group of coal mines of the valley of the river Pandan, situated at Uling and Lutac, of the politico-military district of Cebu.

God protect your excellency many years.

Manila, January 20, 1898.

L. MONCADA.

To the Most Excellent DIRECTOR-GENERAL OF THE TREASURY.

A copy.

L. ESPINA.

ORIGINAL OF ABOVE ORDER AND DECREE.

MANILA, January 22, 1898.

To the Most Illustrious DIRECTOR-GENERAL OF CIVIL ADMINISTRATION.

MOST ILLUSTRIOUS SIR: I have the honor to inform you that on yesterday there was received in this department, with your communication of the 20th instant, the original expediente prepared for the holding of a special session for the public sale of the group of mines of coal of the valley of the river Pandan, situated at Uling and Lutac, of the politico-military district of Cebu.

God, etc.

JANUARY 22, 1898.

To the Inspector-General of Mines, Interventor-General del Estado, Ordenador-General de Pagos, Letrado Consultor, Notario de Hacienda, Jefe de la Seccion:

It having been decreed by the governor-general, July 8, 1897, that before the royal commission in charge of public sales, in the hall of public acts, there be held a public sale on the 22d of this month at 12 o'clock in the forenoon, concerning the preparation of the mines of Uling and Lutac, in the valley of the river Pandan, of the subdivision of Naga, of the province of Cebu, therefore I communicate this to you for your information and to be acted upon.

God, etc.

PROPOSITION TO BID AT THE SALE OF THE MINES OF ULING AND LUTAC, SITUATED IN THE SUBDIVISION OF NAGA, OF THE PROVINCE OF CEBU.

To the president and members of the royal commission regarding sales:

Mr. Neil Macleod, a resident of this capital, being informed of the decree calling for bids, published in the Gazette of Manila under date of July 22 of last year, and the list of conditions which accompanies it, for the concession by public sale of the mines of Uling and Lutac, situated in the subdivision of Naga, province of Cebu, obligates himself to undertake the said concession in strict accordance with the conditions thereof, and agreeing, in accordance therewith to deliver at Tinaan the coal required by the State until the quantity reaches the one-half of the production of the mines at the market price of similar coals, with the rebate of 51 cents Mexican per ton.

Manila, January 22, 1898.

NEIL MACLEOD.

He presented his personal cedula of the fourth class, issued in Manila, and numbered 74.

[Treasury of Manila. Provisional deposit in securities. To be applied on public sales.]

Date of deposit, January 21, 1898. Amount deposited, \$7,000.

By Pablo Mejia, representing Mr. Neil Macleod, to bid at the sale of the mines of Uling and Lutac, situated in the subdivision of Naga, province of Cebu, there has been deposited this day the sum of \$7,000 in treasury obligations of the Philippines,

as a provisional deposit, the details of which are indorsed hereon, and which will be returned in accordance with the regulations of the treasury on the presentation of this certificate of payment, which is taken note of under No. 3 in the record for entering such matters, and 1174 of the day book of receipts. Manila, January 21, 1898.

By order of the treasurer:

CARLOS ERENCHUN.

Inspected by order of the general inspector.

FEDERICO NIN.

Obligations of the treasury of the Philippines.

Series B.	Number of same.	Date of issue.	Coupons and numbers.	Value.
40	61,101 to 61,140	Aug. 1, 1897	2	\$4,000
20	64,731 to 64,750	do	2	2,000
10	64,776 to 64,785	do	2	1,000
	Total			7,000

Pay to the order of the most illustrious director-general of the treasury.

Manila, January 22, 1898.

NEIL MACLEOD.

NUMBER FIFTY-SIX.

In Manila, the 22nd day of January, 1898, before me, Mr. Jose Engracio Mouroy y Torres, a notary of the illustrious college and notarial district of this city, a citizen and resident of the same, at present being through authorization in the hall of public acts of this department of the treasury; there being present the members composing the royal commission in charge of sales of public property of this city, who are Mr. Antonio Dominguez Alfonso, intendente-general de hacienda, president; and Messrs. Enrique Pinto, jefe de negociado de la intervencion-general de la administracion del estado, in place of the interventor; Jose Folla, ordenador-general de pagos, ad interim, in place of the regular general; Benito Perdiguero, letrado consultor, as a substitute; Mr. Jose Carces de Marcilla, jefe de la seccion de impuestos indirectos; Mr. Candido Cabello, subdirector-general de administracion civil; Mr. Luis Espina y Capo, inspector-general de minas, and Mr. Vicente Asencio as secretary, with the object of proceeding with the public sale of the special concession of the groups of mines of Uling and Lutac, in the valley of the river Pandan, situated in the subdivision of Naga, of the island of Cebu, in compliance with royal order No. 575, of May 31st, 1896.

Therefore, at the hour of 12 in the forenoon, the president ordered the criers should announce the session open, which having been done, Mr. Neil Macleod appeared as a bidder, with the document containing his proposition, and the time ordered having passed without there appearing any other bidder, the president proceeded to open the said document, with the result that the said bidder offered to undertake the said concession in strict accordance with the conditions thereof inserted in the Gazette of Manila of July 22nd of the last year, and agreeing in accordance therewith to deliver at Tinaan the coal required by the state until the quantity reaches the one-half of the production of the mines, at the market price of similar coals, with the rebate of fifty-one cents Mex. per ton, and said offer being advantageous to the interests of the treasury, the commission decided to grant provisionally in favor of the said Mr. Neil Macleod the said concession of the matters treated of, with the rebate offered by him, and under strict subjection to the said list of conditions prepared for the concession.

And that this may appear I draw up the present instrument, which the members

of the commission sign, showing that the person making the proposition showed his personal certificate of the fourth class, No. 1071, issued the 11th inst. by this revenue office, of which I certify.

A. DOMINGUEZ ALFONSO.
CANDIDO CABELLO.
ENRIQUE PINTO.
JOSE FOLLA.
JOSE CARCES DE MARCILLA.
LUIS ESPINA Y CAPO.
BENITO PERDIGUERO.
VICENTE ASENCIO.

Notarial mark affixed.

I. ENGRACIO MONROY.

It is scrolled. Notarial seal affixed.

This is a literal copy of the original, which under No. 56 is contained in this year's record, to which I refer, certifying it for use in the offices of the treasury, and the corresponding expediente. I issue the present copy on three sheets of sealed paper of the 12th class of this biennial issue, numbered 698365, 698366, and 698367, on which I place my notarial mark, sign, and scroll, the issuance of the copy being noted on the said original in Manila the date above written. The alterations "grupos," "Pa," and "Bello" are correct.

[NOTARIAL SEAL.]

I. ENGRACIO MONROY.

MOST ILLUSTRIOUS SIR: On the 22d of January last there was held before the royal commission in charge of sales of public property, in the hall of public acts of this city, a public sale for the preparation of the mines of Uling and Lutac, in the valley of the River Pandan, of the subdivision of Naga, of the province of Cebu, there being presented only one proposition, subscribed by Mr. Neil Macleod, he agreeing to undertake the concession treated of, and therefore the said commission declared that proposition admissible, and adjudged provisionally the concession in favor of the person so proposing.

NOTE.—By virtue of what has been expressed the official in charge of the matter has the honor to propose that you deem it proper to confirm the public sale made by the royal commission in charge of sales of public property of this city, and adjudicate the matters referred to in favor of Mr. Neil Macleod definitely.

And if you deem it proper to conform with the proposal there is attached the appropriate form of decree.

Manila, May 18, 1898.

RAMON P. FLORES Y
JOSE JAVIER DE.

The directorate conforms.

MANILA, May 18, 1898.

In conformity with the proposal of the department of indirect imposts this general director of the treasury approves the public sale regarding the special concession of the groups of mines of Uling and Lutac, of the valley of the River Pandan, subdivision of Naga, island of Cebu, made by the royal commission in charge of sales of public property of this capital, and the concession treated of is adjudged definitely in favor of Mr. Neil Macleod, with strict subjection to the list of conditions formed for that purpose.

For the consequent effects return this expediente to the department from which it

came, so that the interested party may be notified of this decision, in order that from and after that date the time mentioned in the list of conditions may commence to run.

DOMINGUEZ ALFONSO.

Mr. NEIL MACLEOD:

MANILA, *May —, 1898.*

The most illustrious director-general of the treasury on the 18th instant was pleased to decree the following: (Preceding decree from the words "In conformity with," down to and including the words "may commence to run," is here inserted.)

Which I communicate to you for your information.

God, etc.

MANILA, *June 20, 1898.*

Pass to the notary's office of the treasury for the preparation of the proper instrument in writing.

Certified copy of the first copy of the instrument of special concession of the groups of coal mines of Uling and Lutac, situated in the subdivision of Naga, of the island of Cebu, executed by the most illustrious Antonio Dominguez Alfonso, director-general of the treasury, as representative of the State, in favor of Mr. Neil Macleod.

Authorized by Mr. Jose Engracio Monroy y Torres, notary of the illustrious college of Manila.

[Mr. Jose Engracio Monroy y Torres, notary of the illustrious college and notarial district of this capital, residing at and with his residence in the same.]

I certify that Mr. Neil Macleod, a merchant, fifty-eight years of age, a married man and resident of this city, with a personal cedula of the fourth class, No. 1061, issued the 11th day of January last, by the internal-revenue department of the treasury, shows me, to be certified, the first copy of the instrument which reads as follows:

"Number three hundred and thirty-seven.

"In Manila, the 30th day of June, 1898, before me, Mr. Jose Engracio Monroy y Torres, a notary of the illustrious college and notarial district of this capital, residing at and with his residence in the same, authorized to act by virtue of sufficient request in this treasury department. The most illustrious Mr. Antonio Dominguez Alfonso, director-general of the treasury of these islands, a resident of this city, in the name and as representative of the State, and Mr. Neil Macleod, 58 years of age, a married man, a merchant, resident of this city, with a personal cedula of the fourth class, No. 1061, issued on the 11th of January last by the internal-revenue department of the treasury; and both possessing the legal capacity necessary for the execution of this instrument, freely and of their own will manifest—

"First. That in the public sale held the 22nd of January last, before the royal commission in charge of sales of public property of this capital, there was adjudged provisionally in favor of Mr. Neil Macleod the special concession of the groups of coal mines of Uling and Lutac, in the valley of the river Pandan, subdivision of Naga, of the island of Cebu, in the form and with the rebate of price offered by said party, and with strict subjection to the list of conditions which served as the basis of the sale, an adjudication which was confirmed definitely by decree of this treasury department, with date the 18th of May last past, which with said list of conditions and its approbation, as well as the instrument containing the proposition of the interested party, the document showing the depositing in the treasury of the amount

required to enter into the bidding, and the award, are contained in the expediente pertaining to the matter and copied in their order in the following terms:

(Here follows list of conditions contained on pages 92, 93, 94, 95, and 96 preceding. Then approval and list of conditions governing reception of bids, contained on pages 99 and 100 hereof; then proposition of Neil Macleod, on page 104; then evidence of deposit in treasury, on pages 104 and 105; then provisional award to Neil Macleod, on pages 105 and 106; then definite award, page 107.)

"Second. That in consequence thereof the most illustrious Antonio Dominguez Alfonso, in his representative capacity, declares that he concedes to Mr. Neil Macleod the concession of the regular exploitation of the coal deposits of Uling and Lutac, in the subdivision of Naga, of the island of Cebu, with strict subjection to the list of conditions inserted in this instrument.

"Third. Mr. Neil Macleod accepts and obligates himself to the exact compliance with all the terms set forth in the said list of conditions. I, the notary, warned the gentlemen executing the within that this instrument had to be taken note of in the recorder's office of the province of Cebu, as without such record being made it would not prejudice a third party and would not be admitted in the courts and tribunals, departments and offices of the Government if the object of the presentation should be to make effective this right of property which should have been recorded to the prejudice of third parties, except in the two cases of exception provided for in art. 389 of the mortgage law.

"So they state and declare, in the presence of the witnesses, Mr. Mariano de Leon y Francisco, a law student, and Mr. Daniel Leceta y Reyes, a scribe, residents of this city; and they having been informed of their right to read the instrument for themselves, I proceeded to the reading of the entire document, the contents of which is ratified by the parties executing the within, and the witnesses sign. Of acquaintance with those appearing, their professions and residences, and of every matter contained in this instrument, I certify.

"A. DOMINGUEZ ALFONSO.

"NEIL MACLEOD.

"MARIANO DE LEON.

"DANIEL LECETA.

"Notarial mark placed.

"J. ENGRACIO MONROY.

"This bears a scroll. Notarial seal.

"This is a literal copy of the original, which is contained in my record of this year, under number 337, to which I refer; and at the request of Mr. Neil Macleod, I issue the present first copy on one sheet of sealed paper of the first class, and six sheets of the tenth class, marked with the numbers 1341, 1126, 1127, 1128, 1129, 1130, and 1131, all of this biennial issue, on which I place my notarial mark, which I sign, and place a scroll, the copying being noted on the said original in Manila the date of the execution. Of all of which, as well as that the alterations 'apropa,' 'trucion,' '5,' 'v,' 'noven,' 'seis,' 'ad,' and the interlineations 'mineras,' 'no,' are valid and the erasure 'de' is not valid, I certify.

"Notarial mark placed thereon.

"J. ENGRACIO MONROY.

"Scroll affixed. Notarial seal."

This is a literal copy of the first copy of the instrument shown me, to which I refer. And by virtue of the request of Mr. Neil Macleod, and to be attached to the corresponding expediente, I issue the present certified copy on seven sheets of sealed paper of the eighth class, numbered 36123, 36122, 36121, 36120, 36119, 36118, and 36117, of this biennial issue, which I seal with the seal of my notarial office, on which I place my notarial mark, which I sign and scroll, having noted the same in the cor-

responding book, in Manila, July 5, 1898. The interlineations "mineras," "no," and the alterations "la Ins" and "seis," are valid.

[Notarial seal.]

J. ENGRACIO MONROY.

MANILA, *July 15, 1898.*

Pass to the advisory department of this treasury department in order that it may be informed.

C. VEGA.

MOST ILLUSTRIOUS SIR: The preceding documents, acknowledged by the notary, Mr. Jose Engracio Monroy, regarding the concession of the mines of Uling and Lutac, in Mindanao (should be Cebu) are executed in accordance with the laws in force; therefore, if you deem it proper, you can give your approval.

Manila, July 29, 1898.

JUAN GARCIA VASQUEZ.

[Copies of papers in the hands of Neil Macleod.—Translations.]

DEPARTMENT OF THE TREASURY,

SECTION OF INDIRECT IMPOSTS.

The illustrious intendente-general of the treasury, on the 18th of the present month, has been pleased to decree the following:

"In conformity with the proposal of the section of indirect imposts this intendencia-general approves the public auction sale of the special concession of the group of mines of Uling and Lutac, in the valley of the river Pandan, district of Naga, of the island of Cebu, made by the board of royal auctions of this capital, and finally adjudicated in favor of Mr. Neil Macleod to perform that which is resolved, with strict subjection to the schedule of conditions formed for that purpose."

This is communicated to you for your knowledge, showing that after the date of this decree of May 18 the time fixed will commence to run, according to the terms fixed in the schedule of conditions.

God guard you many years.

Manila, May 20, 1898.

CARLOS VEGA Y VERDUJO,

The Subintendente.

To Mr. NEIL MACLEOD.

DEPARTMENT OF THE TREASURY,

SECTION OF INDIRECT IMPOSTS.

The illustrious intendente-general of the treasury on this date has been pleased to decree as follows:

"In view of the petition presented by Mr. Neil Macleod, to whom was adjudicated provisionally, at public auction sale held before the board of royal auctions of this capital, on the 22d of January last past, the regular exploitation of the coal deposits of Uling and Lutac, in the district of Naga, province of Cebu, this intendencia-general, in conformity with the proposal of the section of indirect imposts, hereby does prorogue, until such time as navigation shall be possible, the date fixed from which to commence counting the period fixed, in accordance with the schedule prescribed."

This is communicated to you for your information.

God guard you many years.

Manila, July 15, 1898.

JOSE GARCES DE MARCILLA.

To Mr. NEIL MACLEOD.

TABLE I.—COAL ENTRIES IN THE PHILIPPINES, 1853-1867,

	Date of entry.	Name of mine.	Locality.	District.	Province.
1	Apr. 12, 1853	Guila-Guila	Guila-Guila	San Nicolas	Cebu
2	May 30, 1853	Reyna de Castilla.	Carisan	Casiguran	Albay
3	Nov. 7, 1859	San Fernando	Rio Agpaco	San Fernando	Cebu
4	do	Purísima Concepción.	Monte Uling, Arroyo Uling.	Naga	do
5	Nov. 14, 1859	Santa Ysabel	Arroyo Latauan	do	do
6	Dec. 20, 1859	Sin nombre	Monte Baao	Mauban	Tayabas
7	do	do	Monte Mabacong	do	do
8	do	do	Monte Malogonlon	do	do
9	do	do	Monte Malay	do	do
10	Mar. 27, 1860	San Antonio	Arroyo Sacan-Ynulan	San Fernando	Cebu
11	do	San José	Monte Candaujon	do	do
12	do	San Rafael	Arroyo Sacandaujon	do	do
13	Apr. 4, 1860	Santo Niño	Monte Barrio de Bisarél-Bairan, Rio Salaming.	Boljoon	do
14	do	Sin nombre	do	Mambaje	do
15	do	do	do	Dalaguete	do
16	do	do	do	Baletec	do
17	do	do	do	Argao	do
18	do	do	do	Sibonga	do
19	do	do	Visita Matitinao	Badian	do
20	do	do	Visita Timanan or Bacon.	Alegria	do
21	Apr. 26, 1860	San Francisco	Pulong-munti	Atimonan	Tayabas
22	May 1, 1860	Sin nombre	Isla de Capoluan or Pagbilao.	do	do
23	May 3, 1860	Santo Niño	Monte Lutac, Arroyo Pandan.	Naga	Cebu
24	May 4, 1860	Purísima Concepción.	Monte Uling, Arroyo Nas-pit.	do	do
25	May 5, 1860	Santisima Trinidad.	Arroyo Actiue (Active) ..	Jinolanuan ¹	do
26	May 6, 1860	Santa Margarita ..	Arroyo Cambooc	do ¹	do
27	May 13, 1860	Sin nombre	do	Pagbilao	Tayabas
28	May 15, 1860	Santa Filomena	Arroyo Actiue (Active) ..	Jinolanuan ¹	Cebu
29	do	do	Monte Bangamban, Arroyo Latauan.	Minglanilla	do
30	May 16, 1860	San Pedro	Arroyo Ungug	Jinolanuan ¹	do
31	May 17, 1860	Sin nombre	Arroyo Libang-libang ..	do ¹	do
32	do	do	Arroyo Ginalas	do ¹	do
33	do	do	Monte Cambooc, Arroyo Mayan.	do ¹	do
34	do	do	Arroyo Omyom	do ¹	do
35	do	do	Arroyo Maipay	do ¹	do
36	May 18, 1860	San José	Arroyo Naupa	Minglanilla	do
37	do	San Antonio	Arroyo Lanas	do	do
38	do	San Andres	Arroyo Capancan	do	do
39	May 21, 1860	Santo Domingo	Monte Cambaji	Naga	do
40	May 31, 1860	Nuestra Señora del Carmen.	Arroyo Cangarary	Carcar	do
41	June 9, 1860	Sin nombre	Mambog, Rio Togos	Macalelon	Tayabas
42	June 13, 1860	Señor Resurrección	Rio Togos	do	do
43	June 16, 1860	Sagrado Corazón de Jesús.	Pulong-munti	Atimonan	do
44	June 18, 1860	Sin nombre	Bonbon, Rio Cabulijan ..	Gumaca	do
45	do	Nuestra Señora de la Paz.	Pulong-munti	Atimonan	do
46	do	Sin nombre	Balauacan	Calilayan ²	do
47	July 10, 1860	La Paz	Pulong-munti	Atimonan	do
48	July 11, 1860	Virgen del Rosario ..	Isla de Capaluan	Pagbilao	do
49	July 15, 1860	San Camilo	Monte Licos, Arroyo Luigi.	Danao	Cebu
50	do	San Vicente	Arroyo Camansi	do	do
51	July 28, 1860	Santo Domingo	Pulong-munti	Atimonan	Tayabas
52	do	Santa María	do	do	do
53	do	La Purísima Concepción.	do	do	do
54	do	Santa Margarita	do	do	do
55	do	Santisima Trinidad.	do	do	do
56	do	San Antonio	do	do	do
57	Aug. 1, 1860	San Francisco	do	do	do
58	Aug. 31, 1860	Concepción	Bonbon, Rio Cabulijan ..	Gumaca	do
59	Sept. 9, 1860	Nuestra Señora de la Soledad.	Pulong-tubig	Atimonan	do
60	Sept. 11, 1860	Sin nombre	Pinaninding and Ypil ..	do	do
61	Sept. 19, 1860	Asunción	Pulong-munti	do	do
62	Sept. 25, 1860	Sin nombre	Rio Cagliati	Gumaca	do

¹ Now called Coledo.² Now Unisan.

COMPILED FROM THE ARCHIVES OF THE MINING BUREAU.

Number of claims.	Surface.	Name of entryman.	Date of demarcation.	Date of cancellation.	Remarks.
	<i>Sq. yds.</i>				
5	900,000	Diego Viña & Co	Aug. 24, 1854		See for continuation June 25, 1861.
1	180,000	Manuel Castro			
3	540,000	Mariano Roxas		Aug. 3, 1862	
3	540,000	Rafael Amandi		Aug. 2, 1862	
3	540,000	Antonio de Ayala		July 1, 1864	Cancellation not noted. Do.
3	540,000	Francisco Rodríguez		June 8, 1860	
1	180,000	do		do	
1	180,000	do		do	
1	180,000	do		do	
3	540,000	Diego Viña	Jan. 9, 1861		
3	540,000	Dionisio Bustamente	Jan. 10, 1861		
3	540,000	Joaquín García			
3	540,000	Margarita Roxas			
3	540,000	do			
3	540,000	do			
3	540,000	do			
3	540,000	do			
3	540,000	do			
1	180,000	Francisco Villaseñor		June 8, 1860	
2	360,000	Ramón Domínguez		May 15, 1861	
3	540,000	Margarita Roxas		June 1, 1860	Proved not to be coal.
3	540,000	do	Jan. 11, 1861	Mar. 24, 1870	
3	540,000	do		Nov. 11, 1861	
3	540,000	do		do	
1	180,000	José María Baza		May 28, 1860	
3	540,000	Rafael Amandi		July 27, 1862	
3	540,000	Margarita Roxas		Nov. 11, 1861	
3	540,000	Tomás Viña		July 27, 1862	
3	540,000	Margarita Roxas		May 17, 1860	
3	540,000	do		do	
3	540,000	do		do	
3	540,000	do		do	
3	540,000	do		do	
3	540,000	do		do	
3	540,000	do		do	
3	540,000	do		do	
3	540,000	do		do	
3	540,000	do	Jan. 12, 1861	Mar. 24, 1870	
3	540,000	do		July 1, 1864	
1	180,000	Francisco Villaseñor		June 27, 1860	
2	360,000	Gregorio and Felipe Javier		Aug. 19, 1864	
3	540,000	José María Baza		do	
3	540,000	Alejandro Antonio Adulta		May 15, 1861	
3	540,000	Vicente Rilles de León		June 27, 1860	
3	540,000	Gregorio Javier		July 12, 1860	
3	540,000	Vicente Rilles de León	July 20, 1861		
3	540,000	Javier Brothers		Aug. 19, 1864	
3	540,000	Margarita Roxas		July 1, 1864	
3	540,000	do		do	
3	540,000	Mariano Roxas		Aug. 19, 1864	
3	540,000	do		do	
3	540,000	Margarita Roxas		do	
3	540,000	do		do	
3	540,000	Antonio de Ayala		do	
3	540,000	do		do	
3	540,000	Margarita Roxas	June 16, 1861		
2	360,000	Ulloa Manuel de Castro		Aug. 19, 1864	
2	360,000	Simplicio and Luis Javier		do	
2	360,000	Pascual de Ocampo		May 15, 1861	
3	540,000	Margarita Roxas		Aug. 19, 1864	
3	540,000	Juan Vivar		May 15, 1861	

TABLE I.—COAL ENTRIES IN THE PHILIPPINES, 1853-1867, COMPILED

	Date of entry.	Name of mine.	Locality.	District.	Province.
63	Sept. 29, 1860	Virgen de Anti- polo.	Malatondos	Atimonan	Tayabas
64	Sept. 30, 1860	Sin nombre	Camagung (Isla de Ala- bat).	Gumaca	do
65	Oct. 30, 1860	do	Rio Caglati, Arroyo Bun- gasug.	do	do
66	Nov. 5, 1860	Santo Niño	Monte Lutac, Arroyo Pan- dan.	Naga	Cebu
67	Nov. 24, 1860	San Camilo	Monte Licos, Arroyo Lu- gui.	Danao	do
68	do	San Vicente	Arroyo Camansi	do	do
69	Nov. 28, 1860	Asunción	Rio Caglati, Arroyo Bon- gaon.	Gumaca	Tayabas
70	do	San José	Arroyo Caglati	do	do
71	Dec. 14, 1860	San Antonio	Monte Latab	Naga	Cebu
72	do	Nuestra Señora del Carmen.	Monte Campacan	do	do
73	Jan. 30, 1861	Santa Margarita ..	Monte Gumijan, Arroyo Tagbag.	Mauban; Sanji- rin, Isla Alabat.	Tayabas
74	Mar. 13, 1861	Nuestra Señora de la Natividad.	Arroyo Cambaji	Naga	Cebu
75	June 25, 1861	Reyna de Castilla.	Casiguran (Casiran)	Magallanes	Albay
76	July 26, 1861	Sin nombre	Boeboc, Rio Bitogo	Gumaca	Tayabas
77	Oct. 7, 1861	Nuestra Señora de Antipolo.	Monte Licos	Danao	Cebu
78	do	Nuestra Señora del Pilar.	Arroyo Camantija	do	do
79	do	Nuestra Señora del Rosario.	do	do	do
80	Apr. 1, 1862	Rosario	Guindulman, Arroyo Sibod.	Naga	do
81	May 5, 1862	Sin nombre	Arroyo Lonod	Macalelon	Tayabas
82	June 20, 1863	La Natividad de la Santísima Virgen.	Arroyo Cambaji	Naga	Cebu
83	Dec. 18, 1863	La Mina del Sol ..	Rio Malanao	Pagano	Abra
84	July 11, 1866	Nuestra Señora del Rosario.	Arroyo Cabanbauan	Danao	Cebu
85	do	Nuestra Señora del Pilar.	Arroyo Casamantija and Arroyo Cabanbauan.	do	do
86	do	Nuestra Señora de Antipolo.	Monte Lucos, Arroyo Jinandongan.	do	do
87	do	San Vicente	Arroyo Camansi	do	do
88	do	San Camilo	Arroyo Lugui	do	do
89	Aug. 13, 1869	Sin nombre	Pulong-munti	Atimonan	Tayabas

FROM THE ARCHIVES OF THE MINING BUREAU—Continued.

Number of claims.	Surface.	Name of entryman.	Date of demarcation.	Date of cancellation.	Remarks.
2	<i>Sq. yds.</i> 360,000	Luis Javier.....	.....	Aug. 19, 1864	
2	360,000	Timoteo Villaseñor .....	.....	May 15, 1861	
2	360,000	Juan Vivar.....	.....	....do.....	
3	540,000	Margarita Roxas	Jan. 8, 1861	.....	
3	540,000	Mariano Roxas.....	.....	Aug. 3, 1862	
3	540,000	Margarita Roxas .....	.....	July 31, 1864	
3	540,000	do .....	.....	Aug. 19, 1864	
3	540,000	Mariano Roxas.....	.....	....do.....	
3	540,000	Antonio de Ayala .....	.....	.....	
3	540,000	Mariano Roxas.....	July 31, 1862	Mar. 24, 1870	
3	640,000	Margarita Roxas .....	.....	Aug. 19, 1864	
3	540,000	do .....	.....	July 1, 1864	
1	180,000	Manuel Castro.....	Sept. 15, 1861	.....	
3	540,000	Yam-Souti and Lim Tagco .....	.....	Apr. 30, 1864	
3	540,000	Mariano Roxas.....	.....	July 17, 1864	
3	540,000	do .....	.....	July 10, 1863	
3	540,000	do .....	.....	July 10, 1862	
3	540,000	Gabino Veloso.....	July 28, 1862	.....	
3	540,000	Yap-Chantico and Yu-Tioco .....	.....	Apr. 30, 1864	
3	540,000	Mariano Roxas.....	.....	Nov. 3, 1863	
2	360,000	Francisco Javier .....	.....	July 17, 1864	
3	540,000	Margarita Roxas .....	.....	Jan. 8, 1867	
3	540,000	do .....	.....	....do.....	
3	540,000	do .....	.....	....do.....	
3	540,000	do .....	.....	....do.....	
3	540,000	do .....	.....	....do.....	
3	540,000	Tadeo V. Trinidad .....	.....	Aug. 18, 1869	

TABLE II.—COAL ENTRIES IN THE PHILIPPINES, 1868-1899,

	Date of entry.	Name of mine.	Locality.	District.	Province.
1	Nov. 8, 1869	Purísima Concepción.	Monte Uling, Arroyo Nas-pit.	Naga	Cebu
2	Feb. 14, 1871	Sin nombre	Boraboran.....	Nauva and Bato..	Camari nes South.
3	Nov. 3, 1871	Caridad.....	Ginagdanan.....	Compostela.....	Cebu
4	do	Esperanza	Dagdac	do	do
5	Apr. 3, 1873	Magallanes	Masaba or Sili	Danao	do
6	do	Legaspi	Camansi or Tiga.....	do	do
7	July 21, 1873	Sin nombre	Monte del Barrio de Al- quirin.	Pagbilao.....	Tayabas
8	July 22, 1873	Santa Rosa	Lugayan	Danao	Cebu
9	do	Magallanes	Camansi	do	do
10	do	Legaspi	Mantija	do	do
11	Aug. 7, 1873	La Paz de Manzano	Sugud	Bacon	Albay
12	Sept. 17, 1873	La India	do	do	do
13	Sept. 20, 1873	Daraga de Man- zano.	do	do	do
14	do	Luciana de Man- zano.	do	do	do
15	Sept. 30, 1873	Santa Rosa de Manzano.	do	do	do
16	Oct. 10, 1873	Santa Rita de Manzano.	do	do	do
17	Oct. 11, 1873	Ángeles de Man- zano.	do	do	do
18	Oct. 19, 1873	La Soledad de Manzano.	do	do	do
19	Nov. 19, 1873	Villa de Arevalo.	Gatbo, Río Biong.....	do	do
20	do	Santa Marina	Montujar, Río Ysingan	do	do
21	Dec. 2, 1873	Fidelidad	Gatbo, Río Biong.....	do	do
22	do	Dos Amigos	Sarangán	do	do
23	do	Unión	Gatbo, Río Biong.....	do	do
24	Dec. 9, 1873	El Porvenir	Gatbo, Sarango.....	do	do
25	do	El Progreso	Gatbo, Arroyo Bontot	do	do
26	Mar. 21, 1874	Soledad	Tubajon and Mabua	Isla de Dinagat.....	Surigao.....
27	Mar. 26, 1874	Sin nombre	Tubajon	do	do
28	Apr. 1, 1874	Virgen María	Mabua	do	do
29	do	Pascuala	do	do	do
30	Apr. 23, 1874	Tomás y Gabina	Aliton	do	do
31	May 13, 1875	Perseverancia.....	Tambo, Isla de Batan	Bacon	Albay
32	July 18, 1875	Constancia.....	Siguan, Isla de Batan	do	do
33	Oct. 10, 1875	La Paz de Manzano	Tambo, Isla de Batan	do	do
34	do	Santa Rita	Siguan, Isla de Batan	do	do
35	Jan. 18, 1876	Tesoro	Tambo, Isla de Batan	do	do
36	Apr. 21, 1876	Santa Rosa.....	Malabo, Isla de Batan	do	do
37	do	Marta	Potolan, Isla de Batan	do	do
38	do	Voluntad	Masaga, Isla de Batan	do	do
39	do	Espacio	Pisadan, Isla de Batan	do	do
40	July 29, 1877	San Rafael.....	Monte Malolod	Polillo.....	Infanta.....
41	Nov. 22, 1877	Albay	Pisidan, Isla de Batan	Bacon	Albay
42	do	Filipinas	Masaga, Isla de Batan	do	do
43	do	España	Tambo, Isla de Batan	do	do
44	Aug. 22, 1879	Angeles	Tagagkag	Isla de Dinagat.....	Surigao.....
45	Feb. 10, 1886	Ulloa	Calvan	Amulung	Cagayan.....
46	June 13, 1887	Magallanes	Bairan	Danao	Cebu
47	June 23, 1887	Progreso	Licos and Tuganon.....	Compostela.....	do
48	June 28, 1887	Nuevo Langreo	Manganas-anas.....	Danao	do
49	July 4, 1887	Aurora	Ginagdanan and Licos	Compostela	do
50	do	Amella	Ginagdanan	do	do
51	do	Catalina	do	do	do
52	July 8, 1887	Cebuana	Silangon	Danao	do
53	July 14, 1887	Portiella	Biran	do	do
54	do	La Mestiza	Tuganon	do	do
55	do	Casilda	do	do	do
56	do	Las Asturianas.....	do	do	do

COMPILED FROM THE ARCHIVES OF THE MINING BUREAU.

Number of claims.	Surface.	Name of entryman.	Date of concession.	Date of cancellation.	Remarks.
60	Sq. meters. 9,000,000	Antonio Ayala	Feb. 25, 1870	June 1, 1887	
(¹)		Antonio Arejola			
4	600,000	Isaac Con-ui	Jan. 10, 1873		
4	600,000	do	do		
1	150,000	Pascual Veloso		June 20, 1873	No concession granted.
1	150,000	do		do	Do.
		Francisco Villaseñor		July 31, 1873	Under code 1846; not admitted.
4	600,000	Pascual Veloso	May 23, 1874	June 1, 1887 ²	
4	600,000	do	do	do ²	
4	600,000	do	do	do ²	
4	600,000	Juan Manzano Vázquez			Demarcated, but no record of concession.
4	600,000	Gerónimo Camacho			Do.
4	600,000	Juan Anzón			Not demarcated.
4	600,000	José Anzón			Do.
4	600,000	Juan Manzano			Demarcated, but no record of concession.
4	600,000	Canuto Puentevela			Do.
4	600,000	Juan Manzano			Do.
4	600,000	Canuto Puentevela			Not demarcated.
4	600,000	Andrés Figueroa		June 22, 1874	No discovery.
4	600,000	do		do	Do.
4	600,000	do		do	Do.
4	600,000	do		June 23, 1874	Do.
4	600,000	do		do	Do.
4	600,000	do		June 24, 1874	Do.
4	600,000	do		do	Do.
		Constantino Carlotta			Under code 1846; not admitted.
		José Díaz Herrera			Do.
		Constantino Carlotta			Do.
		do			Do.
		José Díaz Herrera			Do.
4	600,000	Canuto Puentevela		Dec. 9, 1876	Demarcation suspended for lack of legal labor.
4	600,000	do		do	Do.
4	600,000	do		do	Do.
4	600,000	do		Dec. 9, 1876	No demarcation.
4	600,000	do			Demarcation suspended for lack of legal labor.
4	600,000	Alejandro Jacobo		Oct. 30, 1877	Demarcated; canceled for failure to present paper for title.
4	600,000	do		do	Do.
4	600,000	do		do	Do.
4	600,000	do		do	Do.
		Antonio Giménez y Tenor		Nov. 16, 1879	Code of 1846; not admitted; canceled by renunciation.
8	1,200,000	Ceferino Arambuso			Demarcated, but no concession.
8	1,200,000	do			Do.
8	1,200,000	do			Do.
1	150,000	Rafael Herrera		July 20, 1880	Canceled by renunciation.
35	5,250,000	Ovideo Fernández			Abandoned.
2	300,000	Sociedad Nuevo Langreo	Mar. 13, 1888		First-class.
20	3,000,000	Juan Labidan	do	1890	Canceled; no other date.
2	300,000	Sociedad Nuevo Langreo	do		First-class.
6	900,000	Juan Labidan		Jan. 28, 1888	Renounced.
7	1,050,000	do		do	Do.
8	1,200,000	do		do	Do.
2	300,000	Sociedad Nuevo Langreo	Mar. 13, 1888		First-class.
2	300,000	do	do		Do.
1	150,000	do	do		Do.
0 ²	100,000	Celestino Mi. Zapico		Feb. 8, 1888	No free land.
0 ²	100,000	do		do	Do.

¹ Not stated; no concession asked.² Noted as abandoned for many years.

TABLE II.—COAL ENTRIES IN THE PHILIPPINES, 1868-1899, COMPILED

	Date of entry.	Name of mine.	Locality.	District.	Province.
57	July 16, 1887	San José	Nabangig	Cataingan	Masbate
58	July 27, 1887	Santa Cruz	do	do	do
59	Mar. 1, 1889	Santa Maria	Painan	Semerara	Mindoro
60	May 26, 1889	Legaspi	Binacungan	Montalban	Manila
61	Mar. 17, 1890	Angeles	Licos	Compostela	Cebu
62	Mar. 26, 1890	San Julián	Sili	Danao	do
63	Apr. 30, 1890	Josefa	Uling and Cambaji	Naga	do
64	do	Casilda	Uling and Campaeán	do	do
65	Nov. 13, 1891	Santa Rosa	Lugayan	Danao	do
66	Dec. 3, 1891	Nuestra Señora del Carmen.	Santa Rosa and Maghiji	do	do
67	Dec. 8, 1891	Mercedes	Alpaco	Naga	do
68	Jan. 10, 1892	Carolina	Siay	Bulalacao	Mindoro
69	do	San Armando	Napisian	do	do
70	do	San Rafael	Siay	do	do
71	do	San Clandio	Napisian	do	do
72	do	San Joaquin	Siay	do	do
73	do	San Ramón	do	do	do
74	do	San Clemente	Napisian	do	do
75	do	Prudencia	do	do	do
76	Feb. 12, 1892	Progreso	Cambumampao	Toledo	Cebu
77	Feb. 18, 1892	Alfonso XIII	Active	do	do
78	Sept. 12, 1892	San Enrique	Tag-angilang or Mangiapugap.	Compostela	do
79	Oct. 19, 1892	Pilar	Ballan	Danao	do
80	Jan. 3, 1893	Maria	Calatoy	Calatrava	West Negros.
81	Dec. 20, 1893	Sodupe	Napisay, Isla de Batan	Bacon	Sorsogon
82	Dec. 21, 1893	Balerma	Pututan, Isla de Batan	do	do
83	do	Urgera	Bencalon, Isla de Batan	do	do
84	do	Ganalda	Lignan, Isla de Batan	do	do
85	Dec. 30, 1893	San Francisco	do	do	do
86	Jan. 31, 1894	Perseverancia	Malabog, Isla de Batan	do	do
87	Apr. 28, 1894	Bilbao	Calabang, Isla de Batan	do	do
88	June 30, 1894	Rafael Reyes	Lupa	Compostela	Cebu
89	Oct. 26, 1894	Lucas y Josefa	Caticatigaban, San Ramón, Isla de Batan.	Bacon	Sorsogon
90	do	Chifadnra	do	do	do
91	Mar. 6, 1895	Carlota	Camansi	Danao	Cebu
92	Mar. 24, 1895	Presentación	Saburi, Isla de Batan	Bacon	Sorsogon
93	do	Allevaga (Olavega).	Aguis, Isla de Batan	do	do
94	July 15, 1895	Maria Cristina	Yidiong	Toledo	Cebu
95	Mar. 22, 1896	Nuevo Cardiff	Calatoy	Calatrava	West Negros.
96	do	Nuevo Cardiff 2d.	Macasilao	do	do
97	do	Nuevo Cardiff 3d.	do	do	do
98	Apr. 4, 1896	Angeles	Tuganon	Compostela	Cebu
99	May 1, 1896	San Félix	Cataitican	Bulalacao	Mindoro
100	Aug. 10, 1897	Elisa	Isla de Batan	Bacon	Sorsogon
101	do	Juanito	Isla de Batan (Babe)	do	do
102	do	Lidia	Catigaban, Isla de Batan	do	do
103	Nov. 15, 1897	Palma	Burat, Isla de Batan	do	do
104	Dec. 13, 1897	Vizcaya	do	do	do
105	Sept. 10, 1898	Paz	Isla de Batan	do	do
106	Sept. 15, 1898	San Jacinto	do	do	do
107	do	San Enrique	do	do	do
108	do	San Ramiro	do	do	do
109	Oct. 28, 1898	Sin nombre	Libod, Isla de Batan	do	do
110	Nov. 3, 1898	La Esperanza	Burard and Manila, Isla de Batan.	do	do
111	do	Magallanes	Carisan	Magallanes	do
112	do	Hanopol	Hanopol	Caramuan	Camarines
113	do	Binacungan	Binacungan	Montalban	Manila
114	Nov. 5, 1898	Danao	Camansi	Danao and Compostela.	Cebu
115	do	Vizayas	Santa Rosa	do	do
116	do	Lugayan	Lugayan	do	do
117	do	Germania	Silo or San Julián	do	do
118	do	Aplicación (Ampliación).	Licos	do	do
119	do	Cebu	Santa Rosa	do	do
120	do	Mnao	Parel, Muao y Cotcot	do	do
121	do	Dapdap	do	do	do
122	Nov. 11, 1898	Good Hope	Arroyo Bougaon	Gumaca	Tayabas

FROM THE ARCHIVES OF THE MINING BUREAU—Continued.

Number of claims.	Surface.	Name of entryman.	Date of concession.	Date of cancellation.	Remarks.
	<i>Sq. meters.</i>				
4	600,000	José Muñoz de Bustillo....	May 31, 1888	.....	First-class.
4	600,000	do. ¹	do.....	.....	Do.
2	300,000	Antonio de Yribir.....	May 12, 1893	.....	Do.
11	1,650,000	Anacleto del Rosario.....	.....	.....	Abandoned.
12	1,800,000	Ramón Montañes.....	May 16, 1891	.....	First-class.
8	1,200,000	Sociedad Nuevo Langreo.....	do.....	.....	Do.
8	1,200,000	Florentino Rallos.....	do.....	Mar. 20, 1894	.....
8	1,200,000	do.....	do.....	do.....	.....
4	600,000	Ramón Montañes.....	July 8, 1892	Mar. 10, 1894	.....
8	1,200,000	Sociedad Nuevo Langreo..	June 18, 1892	do.....	.....
8	1,200,000	do.....	do.....	do.....	.....
4	600,000	Rafael Cascarosa y Martínez.	May 12, 1893	.....	Do.
4	600,000	do.....	do.....	.....	Do.
4	600,000	do.....	do.....	.....	Do.
4	600,000	do.....	do.....	.....	Do.
4	600,000	do.....	do.....	.....	Do.
4	600,000	do.....	do.....	.....	Do.
4	600,000	do.....	do.....	.....	Do.
2	300,000	Cornelio Roberto Blair Pickford.	June 19, 1896	.....	Do.
4	600,000	do.....	do.....	.....	Do.
4	600,000	Ramón Montañes.....	July 5, 1894	.....	Do.
4	600,000	Julián Roji.....	.....	Feb. 2, 1894	No discovery.
4	600,000	Francisco Ga. Romero.....	.....	July 3, 1895	Abandoned.
2	300,000	Jacinto Gil Gorroño.....	Dec. 6, 1895	.....	First-class.
1	150,000	Sres. Villanueva & Co.....	Aug. 16, 1895	.....	Do.
1	160,000	do.....	do.....	.....	Do.
1	150,000	do.....	do.....	.....	Do.
4	600,000	Emilio Muñoz.....	Oct. 11, 1895	.....	Do.
1	160,000	Sres. Villanueva & Co.....	Aug. 16, 1895	.....	Do.
4	600,000	Jacinto Gil Gorroño.....	Dec. 6, 1895	.....	Do.
2	300,000	Ramón Montañes.....	Oct. 11, 1895	.....	Do.
1	160,000	Jacinto Gil Gorroño.....	Dec. 6, 1895	.....	Do.
1	150,000	do.....	do.....	.....	Do.
1	150,000	Sociedad Nuevo Langreo..	June 6, 1896	.....	Do.
2	300,000	Jacinto Gil Gorroño.....	Dec. 6, 1895	.....	Do.
2	300,000	do.....	do.....	.....	Do.
4	600,000	Cornelio Roberto Blair Pickford.	June 19, 1896	.....	Do.
4	600,000	Martin Buck and Joaquín Cassanovas y Lovett.	.....	.....	Second-class.
4	600,000	do.....	.....	.....	Do.
4	600,000	do.....	.....	.....	Do.
8	1,200,000	Ramón Montañes.....	Mar. 23, 1898	.....	First-class.
4	600,000	Victor Herrera.....	.....	.....	Second-class
1	150,000	Enrique Gil Gorroño.....	.....	.....	Do.
4	600,000	Jacinto Gil Gorroño ².....	.....	.....	Do.
2	300,000	Pablo Emilio Herrmann ².....	.....	.....	Do.
2	300,000	Rosello Vich y Rosello ³.....	.....	.....	Do.
24	3,600,000	Jacinto Gil Gorroño.....	.....	.....	Do.
4	600,000	Enrique Gil Gorroño.....	.....	.....	Third-class
4	600,000	Jacinto Gil Gorroño.....	.....	.....	Do.
4	600,000	do.....	.....	.....	Do.
4	600,000	do.....	.....	.....	Do.
2	300,000	Henry Brodek.....	.....	.....	Do.
6	900,000	José Verches y Vera.....	.....	.....	Do.
4	600,000	Antonio Fuset.....	.....	.....	Do.
60	9,000,000	do.....	.....	.....	Do.
30	4,500,000	Ramón Montañes.....	.....	.....	Do.
4	600,000	Enrique Spitz.....	.....	.....	Do.
4	600,000	do.....	.....	.....	Do.
4	600,000	do.....	.....	.....	Do.
23	3,450,000	do.....	.....	.....	Do.
60	9,000,000	do.....	.....	.....	Do.
27	4,050,000	do.....	.....	.....	Do.
44	6,600,000	do.....	.....	.....	Do.
45	6,750,000	do.....	.....	.....	Do.
4	600,000	Edouard C. André.....	.....	.....	Do.

¹ Jose Muñoz.² Correct to Enrique Gil Gorroño.³ Correct to Rafael Vich y Roselló.

TABLE II.—COAL ENTRIES IN THE PHILIPPINES, 1868–1899, COMPILED

	Date of entry.	Name of mine.	Locality.	District.	Province.
123	Nov. 11, 1898	Césarine de Court.	Bambang.....	Gumaca	Tayabas
124	do	Wealthy	Arroyo Paglati	do	do
125	do	Franco	Baao	Mauban	do
126	do	Abondance	Sanjirin, Isla de Alabat ..	do	do
127	do	Sainte Barbe	Malay	do	do
128	do	Arbiguay	Baao	do	do
129	do	Clémentine	Monte Malolod	Polillo	Infanta
130	do	Jean	Malagonlong	Mauban	Tayabas
131	do	Auguste	Baao	do	do
132	do	Richfield	Camagon	Atimonan	do
133	Nov. 14, 1898	Cacub.....	Cacub and Dapa (Isla Siargao).	Numancia and Cabuntug.	Surigao.....
134	Nov. 23, 1898	San José	Sam-ang	Loquilocon	Samar
135	Jan. 12, 1899	Butian	Birombato and Butnan, Isla de Batan.	Bacon	Sorsogon

FROM THE ARCHIVES OF THE MINING BUREAU—Continued.

Num- ber of claims.	Surface.	Name of entryman.	Date of con- cession.	Date of can- cellation.	Remarks.
	<i>Sq. meters.</i>				
4	600,000	Edouard C. André.....	.....	.....	Third-class.
4	600,000	do.....	.....	.....	Do.
4	600,000	do.....	.....	.....	Do.
4	600,000	do.....	.....	.....	Do.
4	600,000	do.....	.....	.....	Do.
4	600,000	do.....	.....	.....	Do.
4	600,000	do.....	.....	.....	Do.
4	600,000	do.....	.....	.....	Do.
4	600,000	do.....	.....	.....	Do.
60	9,000,000	Isidoro Sanger.....	.....	.....	Do.
30	4,500,000	do.....	.....	.....	Do.
4	600,000	José Maria Yesiaz.....	.....	.....	Do.

TABLE III.—STATEMENT OF THE LABORATORY ASSAYS.

[Verified by the engineer subscribing in the laboratory of the inspectorate of mines, with the coals of Compostela (island of Cebu), in relation with the foreign coals that are sold in the market of Manila, in August, 1878.]

Number.	Source of the combustible.	Composition by the hundred parts.				Flame.		Coke, nature of.	Ashes, color of.	Carbon equivalents.		Caloric.	
		Density.	Fixed carbon.	Volatile matter.	Water.	Ashes.	Duration.	Nature of.		By volatile matter.	By the combustible.	From the combustible matter.	From the combustible.
1	Vein of the gallery Esperanza mine, of Caridad, Cebu.	1.329	51.96	37.56	7.80	2.68	6	Long, reddish....	Brick red.....	0.202	0.721	1,632	5,829
2	Vein of the gallery Caridad mine, of Caridad, Cebu.	1.340	54.56	34.53	9.60	1.31	4½	Medium, reddish.	Clear red.....	.167	.698	1,369	5,643
3	Australian mixture, Newcastle and Sydney.	1.365	71.45	16.25	2.90	9.40	6½	Long, brilliant, with dark points.	Swollen and brilliant.	.053	.768	432	6,205
4	English Cardiff (2).....	1.389	83.00	8.60	4.50	3.90	5	Short and dark....	Characteristic gray.	.103	.932	842	7,530
5	Upper outcropping of the abandoned mine Santa Rosa.	1.319	57.94	31.75	9.23	1.08	4	Medium, bluish....	Reddish.....	.083	.662	671	5,353
6	Outcropping of Barran in the abandoned mine Magallanes.	1.305	49.50	35.03	11.18	3.62	4	Medium, clear....	Reddish yellow..	.184	.678	1,491	5,490
7	Outcropping of Mantija in the abandoned mine Legaspi.	1.320	47.30	33.43	16.65	2.62	3½	do.....	Red.....	.075	.625	605	4,642
8	Outcropping of Magliti (upper part).	1.301	37.92	37.34	18.75	5.99	3	Short, dark.....	Very red.....	.161	.540	1,305	4,367
9	Outcropping of Baisabais, Cajumay, and Jumayan.	1.315	50.50	30.85	16.12	2.53	4½	Medium, dark....	Yellowish.....	.131	.636	1,058	5,139
10	Maulineop (Tagamacan, Balamban)	1.262	48.09	31.68	17.20	3.03	5	Medium, reddish....	Very red.....	.106	.887	860	4,747

TABLE III.—STATEMENT OF THE LABORATORY ASSAYS.

[Verified by the engineer subscribing in the laboratory of the inspectorate of mines, with the coals of Compostela (island of Cebu), in relation with the foreign coals that are sold in the market of Manila, in August, 1878.]

Number.	Source of the combustible.	Composition by the hundred parts.					Flame.		Coke, nature of.	Ashes, color of.	Carbon equiv- alents.		Caloric.	
		Density.	Fixed car- bon.	Volatile matter.	Water.	Ashes.	Duration.	Nature of.			By vol- atile matter.	By the com- bust- ible.	From the vol- atile matter.	From the com- bust- ible.
1	Vein of the gallery Esperanza mine, of Caridad, Cebu.	1.329	51.96	37.56	7.80	2.68	6	Long, reddish.....	Almost solid.....	Brick red.....	0.202	0.721	1,632	5,829
2	Vein of the gallery Caridad mine, of Caridad, Cebu.	1.340	54.56	34.53	9.60	1.31	4½	Medium, reddish.....	Pulverized.....	Clear red.....	.167	.698	1,369	5,643
3	Australian mixture, Newcastle and Sydney.	1.365	71.45	16.25	2.90	9.40	6½	Long, brilliant, with dark points.	Swollen and bril- liant.	Reddish gray.....	.053	.768	432	6,205
4	English Cardiff (2).....	1.389	83.00	8.60	4.50	3.90	5	Short and dark.....	Almost pulverized	Characteristic gray.	.103	.932	842	7,530
5	Upper outcropping of the aban- doned mine Santa Rosa.	1.319	57.94	31.75	9.23	1.08	4	Medium, bluish.....	Pulverized.....	Reddish.....	.083	.662	671	5,353
6	Outcropping of Balran in the aban- doned mine Magallanes.	1.305	49.50	35.03	11.18	3.62	4	Medium, clear.....	do.....	Reddish yellow ..	.184	.678	1,491	5,490
7	Outcropping of Mantija in the aban- doned mine Legaspi.	1.320	47.30	33.43	16.65	2.62	3½	do.....	do.....	Red.....	.075	.625	605	4,642
8	Outcropping of Maglifi (upper part).	1.301	37.92	37.34	18.75	5.99	3	Short, dark.....	do.....	Very red.....	.161	.540	1,305	4,367
9	Outcropping of Baisbals, Cajunay, and Jumayan.	1.315	50.50	30.85	16.12	2.53	4½	Medium, dark.....	do.....	Yellowish.....	.131	.636	1,058	5,139
10	Maulineop (Tagamacan, Balamban)	1.262	48.09	31.68	17.20	3.03	5	Medium, reddish.....	do.....	Very red.....	.106	.887	860	4,747

TABLE IV.—COMPARATIVE TABLE OF THE LABORATORY TESTS MADE OF THE COALS OF COMPOSTELA, IN CEBU, AND BULALACAO, IN MINDORO, 1880.

Procedure of the coals.	Composition to 100 parts.				Ashes.		Coke.	Flame.	Carbon equivalents.		Caloric.		
	Density.	Fixed carbon.	Volatile matter.	Water.	Quantity.	Color.			As to volatile matter.	As to combustible.			
Cebu:													
Vein of the gallery Es-	1.329	51.96	37.56	7.50	2.68	Brick red.....	Nearly solid			0.202	0.721	1,632	5,829
peranza, Caridad.	1.340	54.56	34.53	9.60	1.31	Clear red	Pulverized			.167	.698	1,369	5,643
Do													
Cropping of Bulalacao, Min-	1.282	41.06	42.14	12.50	4.30	Reddish yellow...	Brilliant, with in-			.232	.643	1,880	5,198
doro.							dications of fu-						
							sion.						

TABLE V.—THE COAL OF JAPAN AND NEIGHBORING ISLANDS.

Elementary analysis.	I. Taka-shima.	II. Mûke.	III. Karatsu.	IV. Sorachi.	V. Horumui.	VI. Hou-shiki.	VII. Mid-zunuki.	VIII. Kelung.
A.								
Water	1.320	0.536	2.690	2.928	8.479	5.360	3.714	3.774
Carbon	78.633	69.280	69.436	77.040	68.842	65.221	57.689	73.013
Hydrogen	5.816	5.524	5.156	5.685	4.771	5.222	4.620	6.313
Oxygen and nitrogen	8.721	4.888	11.920	11.014	15.180	10.118	10.144	15.129
Sulphur	.659	3.488	1.177	.542	.472	1.607	3.765	1.087
Ash	4.851	16.284	9.621	2.791	2.256	12.472	20.068	4.408
Total	100.000	100.000	100.000	100.000	100.000	100.000	100.000	100.000
B.								
Water evaporation at 40° C.	1.32	0.54	2.69	2.93	8.48	5.36	3.51	3.77
Combustible gases ..	38.13	38.51	40.13	35.03	37.52	35.95	22.98	52.13
Carbon residuum ..	55.45	43.36	47.12	59.05	51.67	46.11	67.51	43.47
Ash residuum	5.10	17.50	10.04	2.99	2.43	13.08	6.00	4.41
Total	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00
Specific gravity	1.260	1.335	1.349	1.279	1.323	1.351	.....	1.254

Of the coal classified above, I, II, and III are from Kiusbin, and IV, V, VI, and VII from Yezo. Their analysis is taken from the work "Yesso Coals, by H. Munroe, Tokio, 1874." Number VIII is taken from F. Hawks' narrative, "Perry Expedition," vol. ii, pp. 167, 168.

TABLE VI.—ANALYSES OF SOME CANNEL COALS AND LIGNITES.

Locality.	Specific gravity.	Carbon.	Hydrogen.	Oxygen.	Nitrogen.	Sulphur.	Ash.	Water.
		<i>Per cent.</i>	<i>Per cent.</i>	<i>Per cent.</i>	<i>Per cent.</i>	<i>Per cent.</i>	<i>Per cent.</i>	<i>Per cent.</i>
Lignites:								
Cologne	1.100	63.29	4.98	26.24			8.49	.....
Devonshire		66.31	5.63	22.86	0.57	2.36	2.36	.....
Styria		50.72	5.34	33.18	2.80	.90	7.86	.....
Cannel coal:								
Van Diemens Land	1.180	79.34	10.41	4.93		5.32	.....	.....
Nova Scotia		82.67	9.14	8.19			.....	.....
Scotland (Boghead)		63.10	8.91	7.25		.96	19.78	.....
Lancashire (Wigan)	1.276	80.07	5.53	8.08	2.12	1.50	2.70	0.91

TABLE VII.—ELEMENTS OF VARIOUS AMERICAN LIGNITES.

Location.	Specific gravity.	Fixed carbon.	Volatile matter.	Water.	Ash.	Total volatile.	Coke.
		<i>Per cent.</i>	<i>Per cent.</i>	<i>Per cent.</i>	<i>Per cent.</i>	<i>Per cent.</i>	<i>Per cent.</i>
Kentucky	1.20	40	23	30	7	53	47
Blandville	1.17	31	48	11.5	9.5	59.5	40.5
Washington Territory		58.25	31.75	7	3	38.75	61.25
Vancouver Island		62	31	4	3	35	65
Colorado:							
Carbon Cy.	1.27	41.25	46	3.5	9.25	49.5	50.5
Canon City	1.23	56.8	34.2	4.5	4.5	38.7	61.3
Arkansas		34.5	28.5	32	5	60.5	39.5
Texas, Robertson County	1.23	45	39.5	11	4.5	50.5	49.5

TABLE VIII.—ANALYSIS OF PHILIPPINE COALS COMPARED WITH CARDIFF, AUSTRALIAN, AND WYOMING COALS.

Description of mine.	Location.	Fixed carbon.	Volatile matter.	Water.	Ash.	Caloric volatile matter.	Caloric fixed carbon.	Remarks.
Cardiff	England	<i>P. ct.</i> 83.00	<i>P. ct.</i> 8.60	<i>P. ct.</i> 4.50	<i>P. ct.</i> 3.90	842	7,530	91.60 fuel.
Newcastle and Sidney.	Australia	71.45	16.25	2.90	9.40	432	6,205	87.70 fuel; mixed.
Santa Rosa	Cebu	57.94	31.75	9.23	1.08	674	5,353	89.69 fuel.
Van Dyke	Rock Springs, Wyo.	56.50	34.50	6.25	2.75	.....	.....	91.00 fuel; commercial "Rock Springs."
Sweetwater Coal Co.	do	55.70	36.95	5.55	1.80	.....	.....	92.65 fuel; commercial "Rock Springs."
U. P. No. 1	do	55.60	36.42	5.38	2.60	.....	.....	92.02 fuel; U. P. R. R. "Rock Springs."
Caridad	Cebu	54.56	34.53	9.60	1.31	1,369	5,643	89.09 fuel.
Dillon	Rawlins	54.00	32.85	6.55	6.60	.....	.....	86.85 fuel; commercial steam.
Esperanza	Cebu	51.96	37.56	7.80	2.68	1,632	5,829	89.52 fuel.
Magallanes	do	49.50	35.03	11.18	3.62	1,491	5,490	84.53 fuel; 0.67 foreign matter.
U. P. No. 7	Almy, Wyo	48.75	34.88	7.37	9.00	.....	.....	83.63 fuel; C. P. & U. P. R. R. locomotive.
U. P. No. 2	Carbon, Wyo	48.30	35.43	7.42	8.85	.....	.....	83.73 fuel; U. P. R. R. locomotive.
Deer Creek Coal Co.	Glemock, Wyo.. ..	47.75	33.03	13.82	5.40	.....	.....	80.78 fuel; F. E. & M. V. R. R. locomotive.
Grinnell	Sheridan, Wyo.. ..	44.75	33.18	14.42	7.65	.....	.....	77.93 fuel; B. & M. R. R. in Neb. locomotive.
Burgess	do	44.70	37.55	13.05	4.70	.....	.....	82.25 fuel; commercial steam.
Antelope	Cambria, Wyo ..	44.25	39.38	6.72	9.65	.....	.....	84.63 fuel; Black Hills coke.
M. & M	Buffalo, Wyo ..	44.20	34.30	14.70	6.80	.....	.....	78.50 fuel; commercial steam.
Jumbo	Cambria, Wyo ..	43.65	40.13	5.72	10.50	.....	.....	83.78 fuel; Black Hills coke.
Inez Coal Co	Inez, Wyo	42.50	36.05	14.65	6.80	.....	.....	78.55 fuel; F. E. & M. V. R. R. locomotive.
Cataingan	Masbate	41.40	43.31	10.50	4.38	.....	.....	84.71 fuel; 0.41 sulphur.
Bulalacao	Mindoro	41.06	42.14	12.50	4.30	.....	.....	83.20 fuel.
Becker	Sheridan, Wyo.. ..	38.75	44.37	8.72	8.21			83.12 fuel; commercial steam.
U. P. No. 1	Hanna	38.70	35.25	14.10	11.90			73.95 fuel; U. P. R. R. locomotive.

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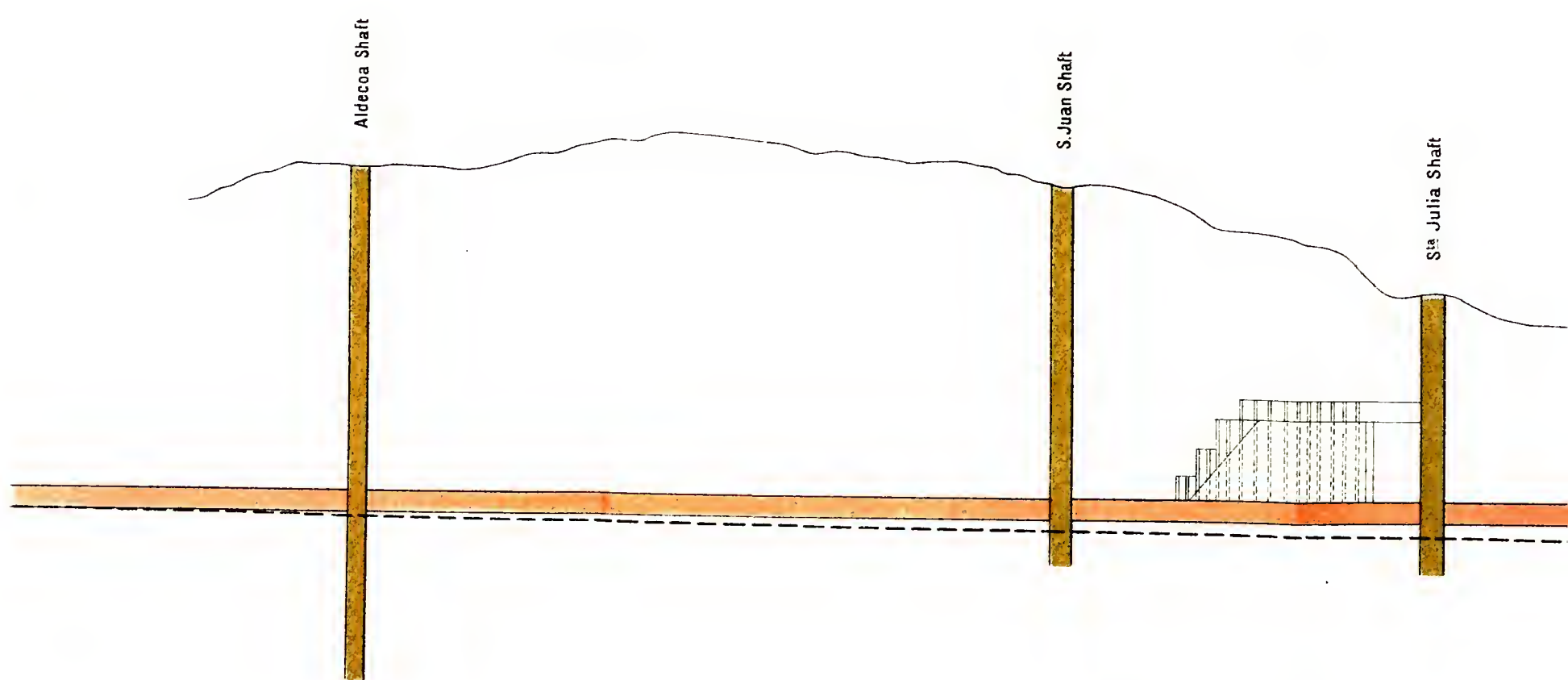
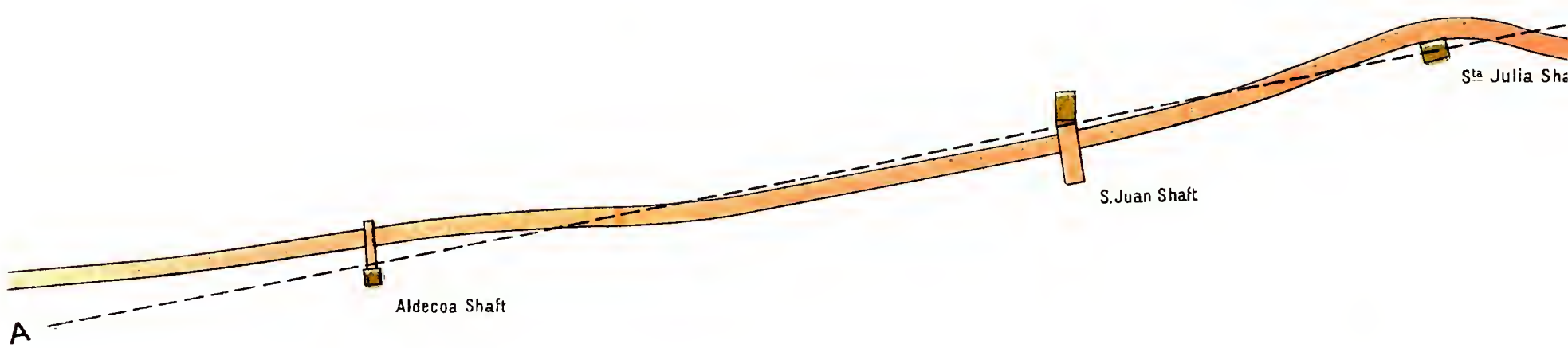
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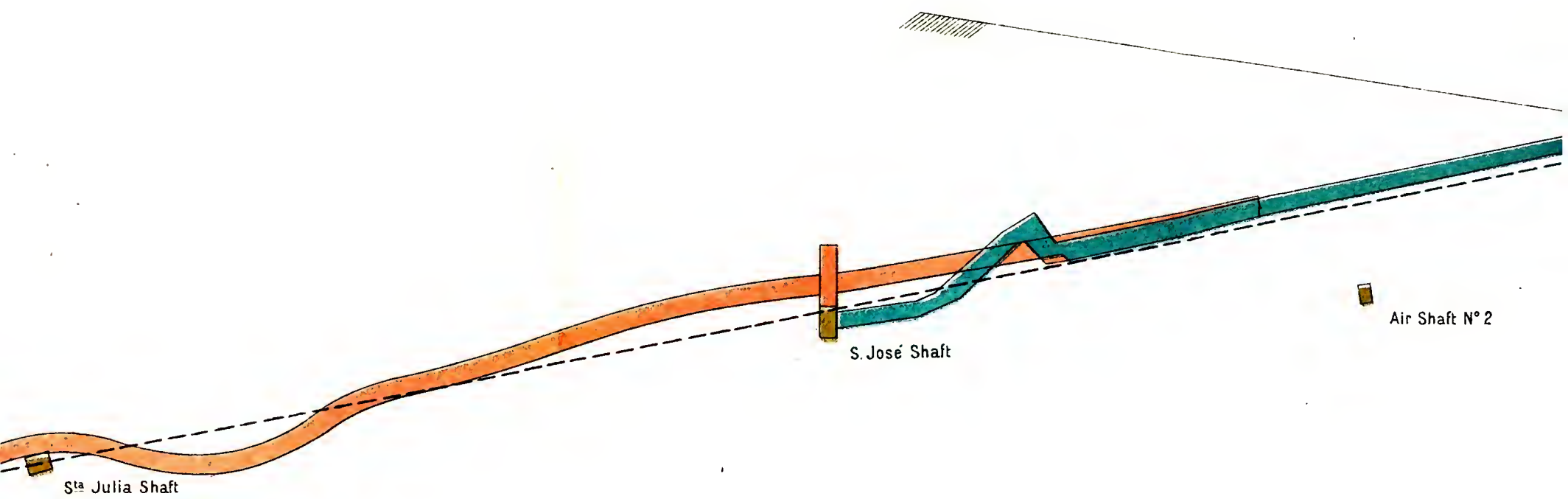
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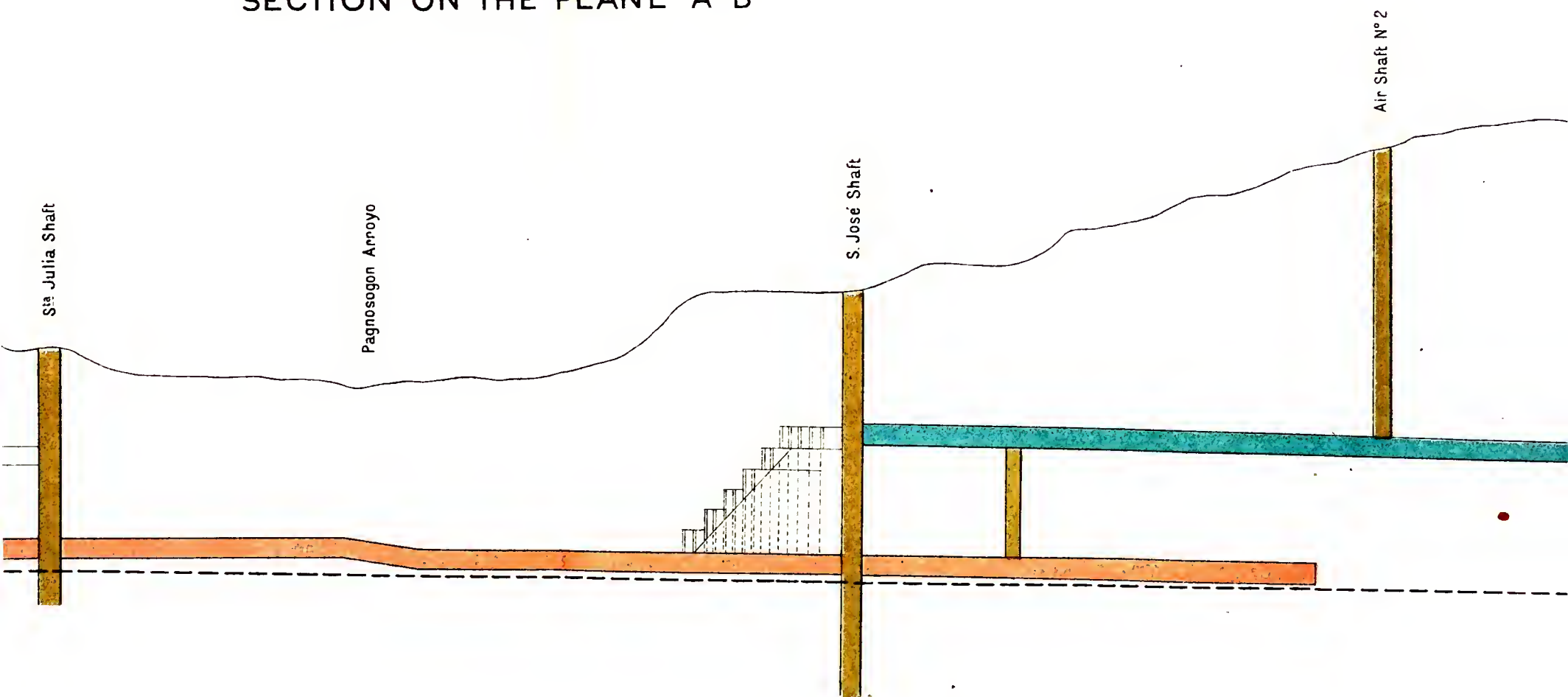
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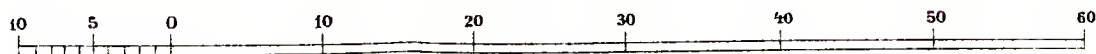


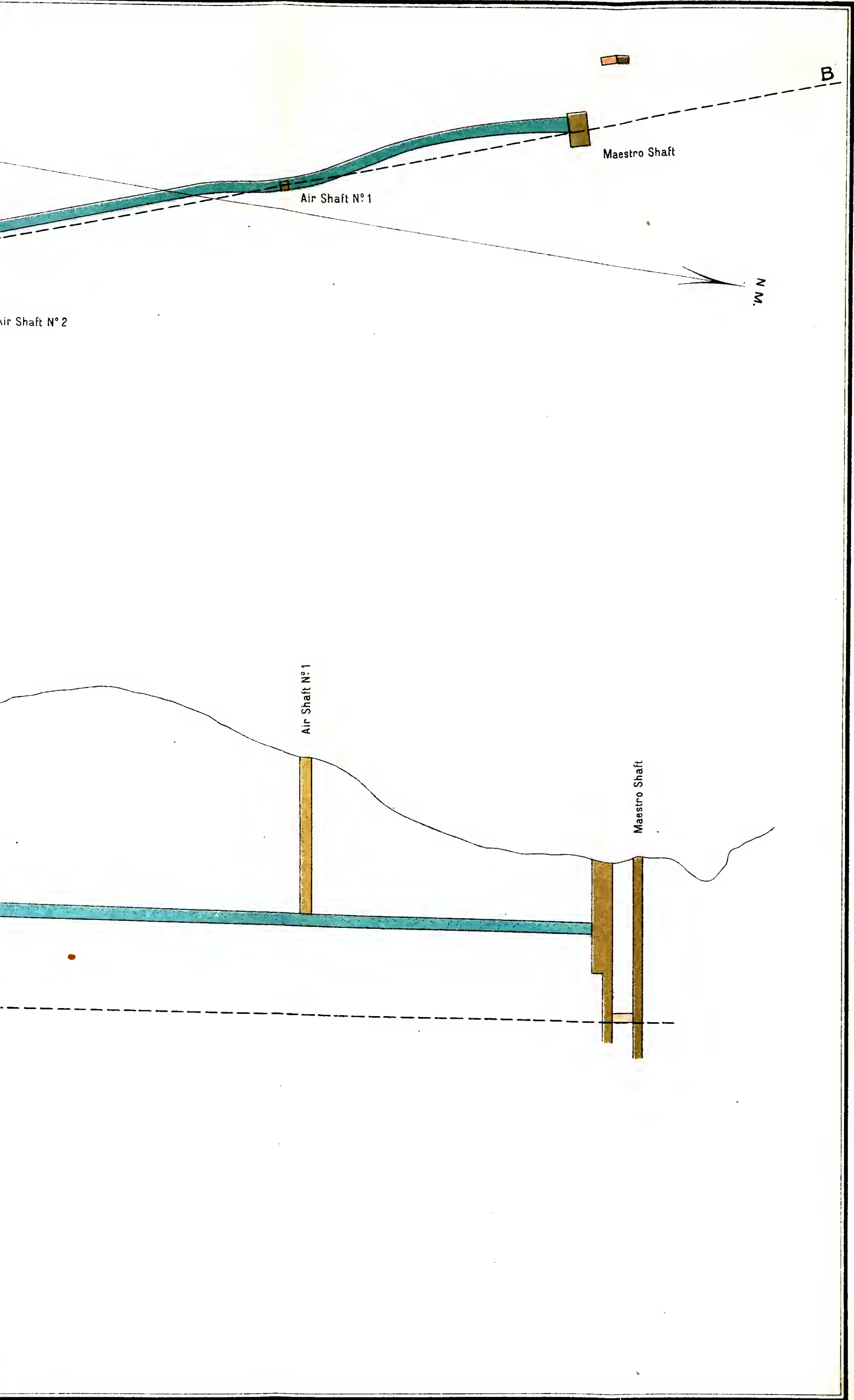


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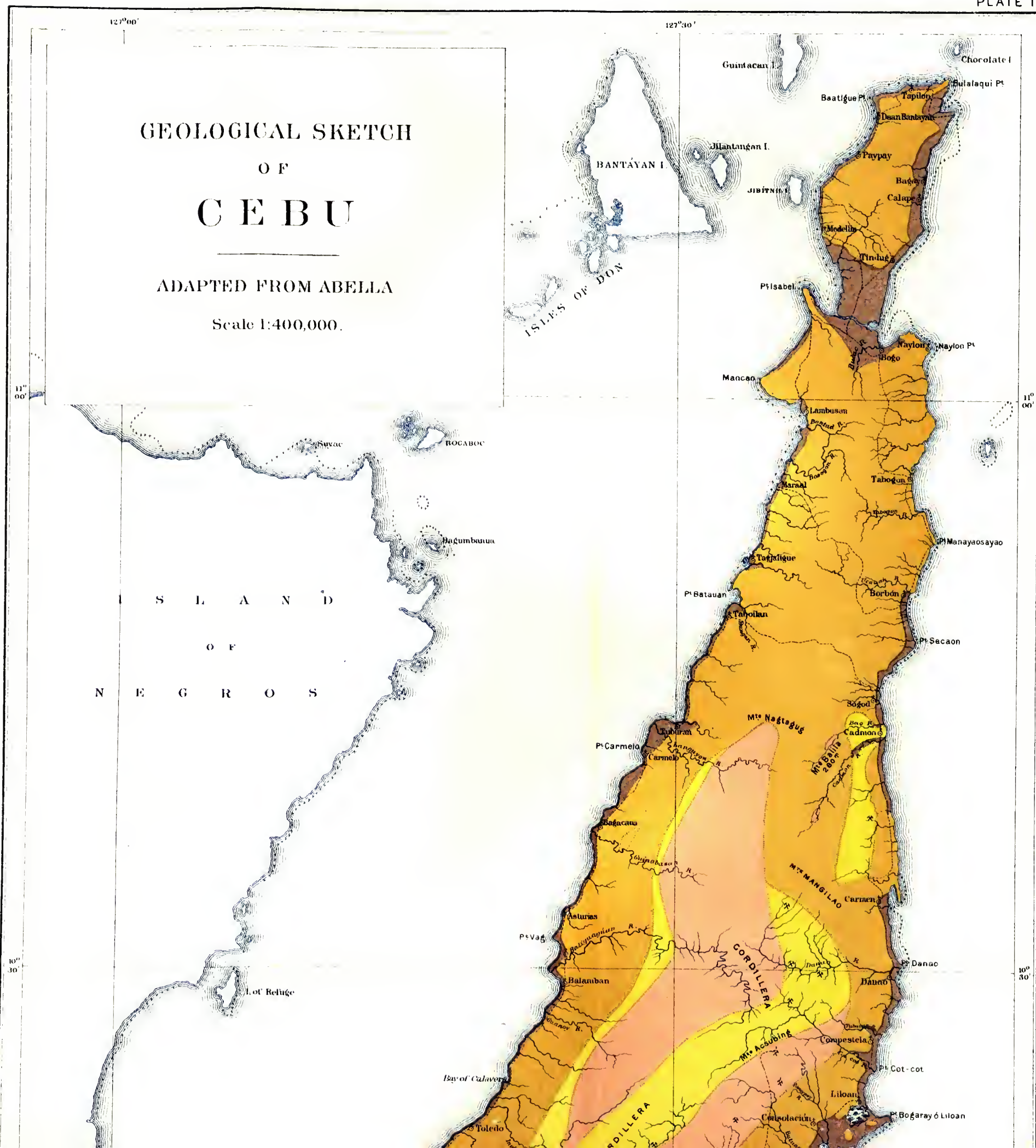




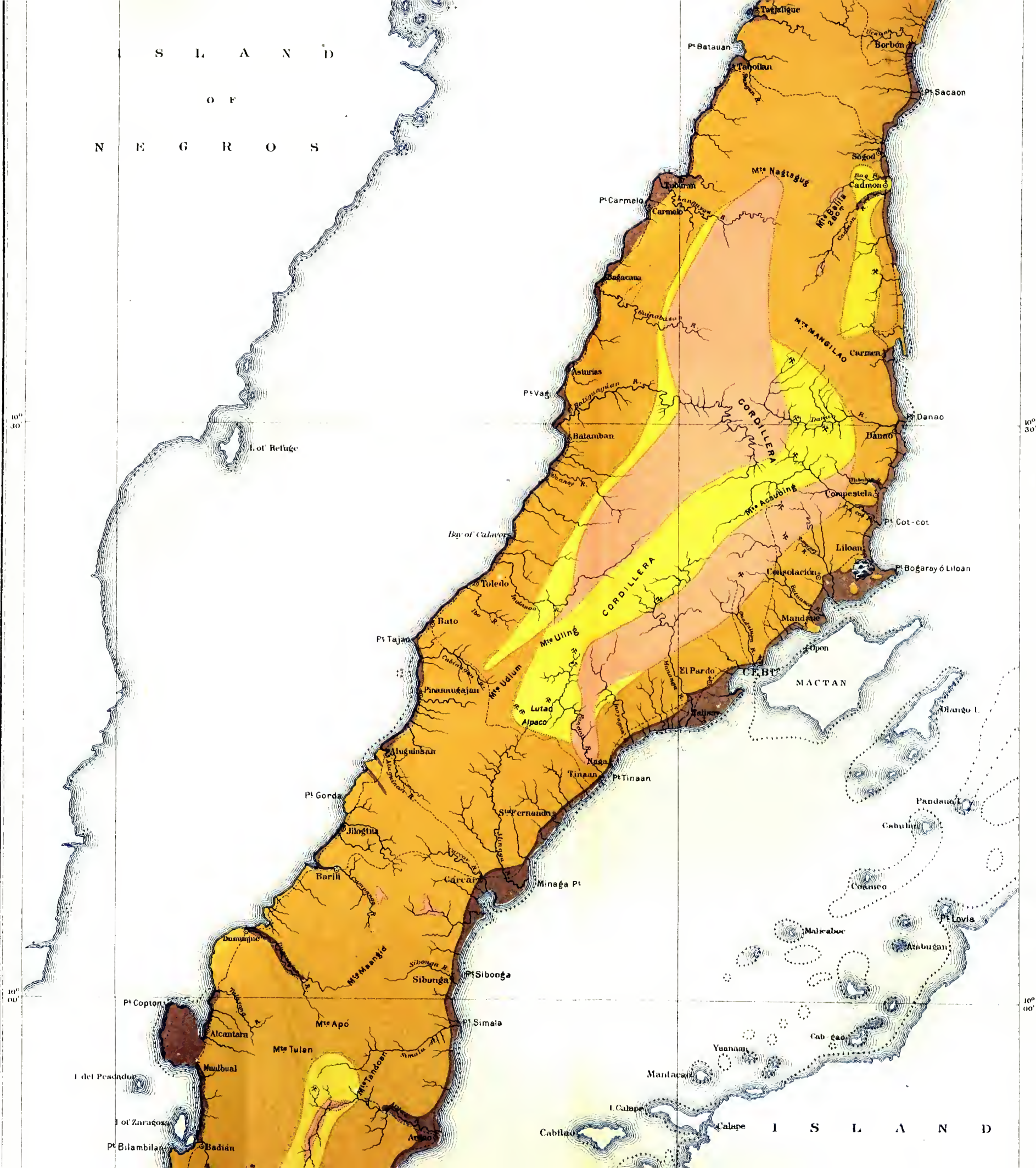
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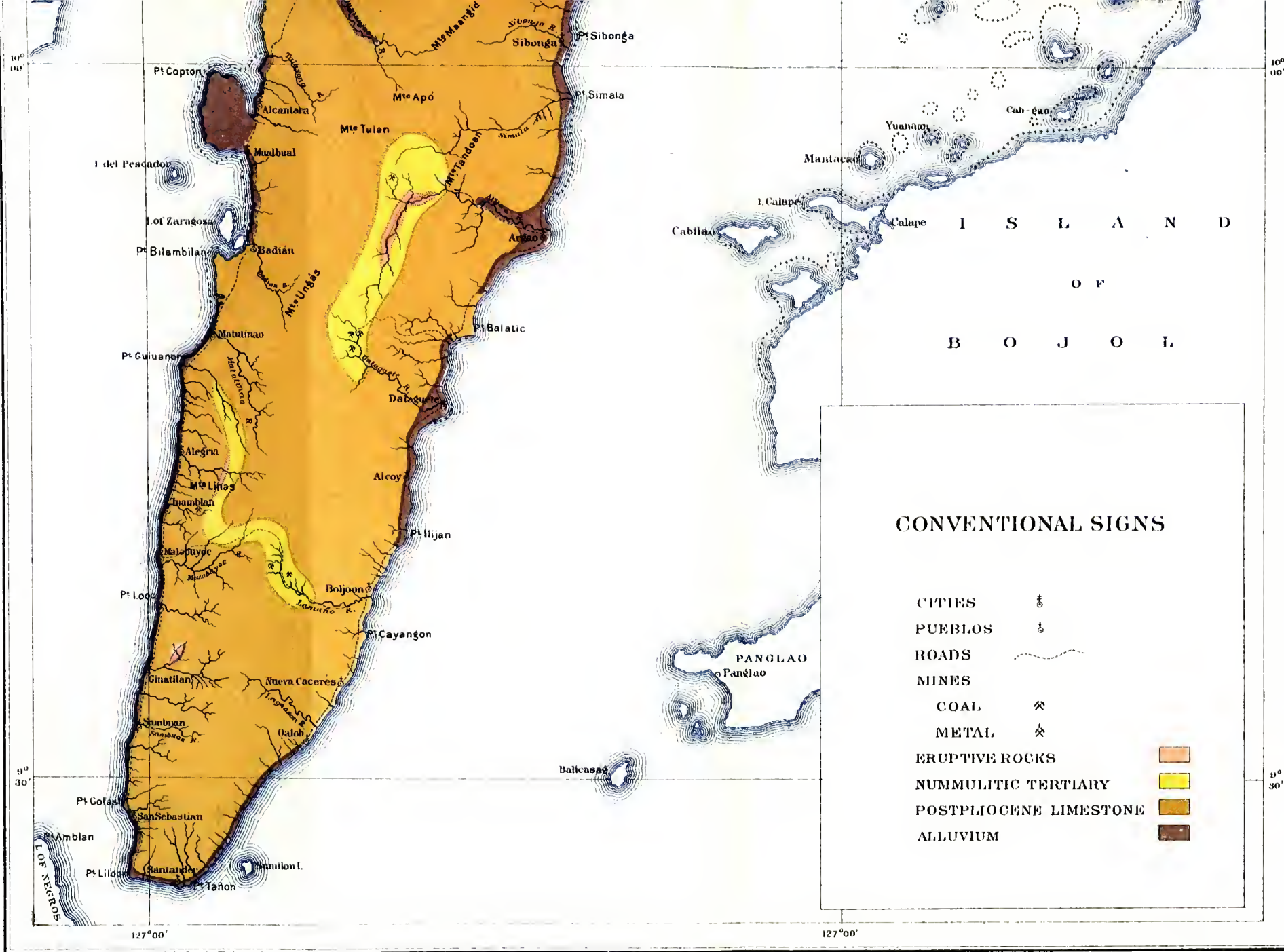
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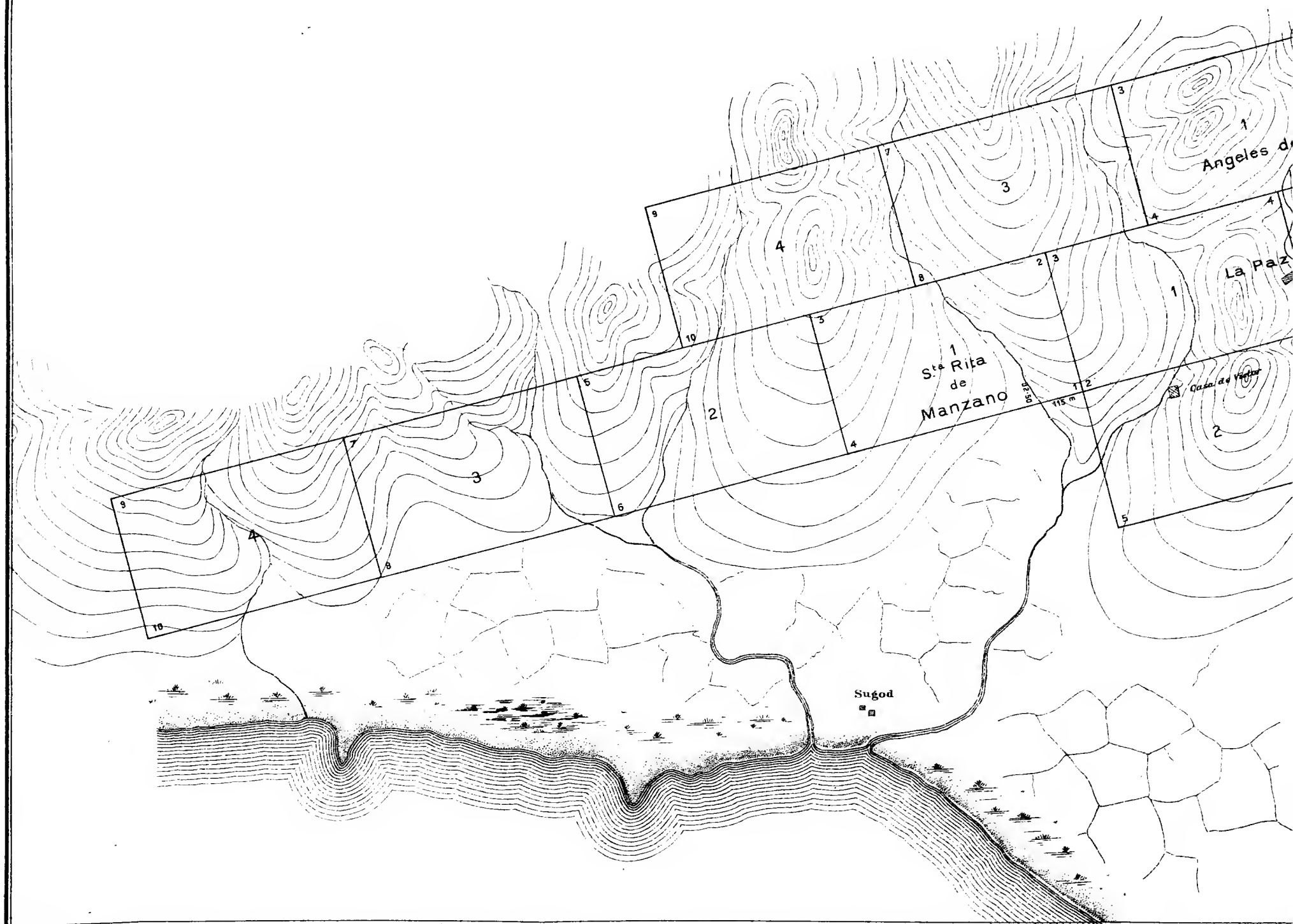


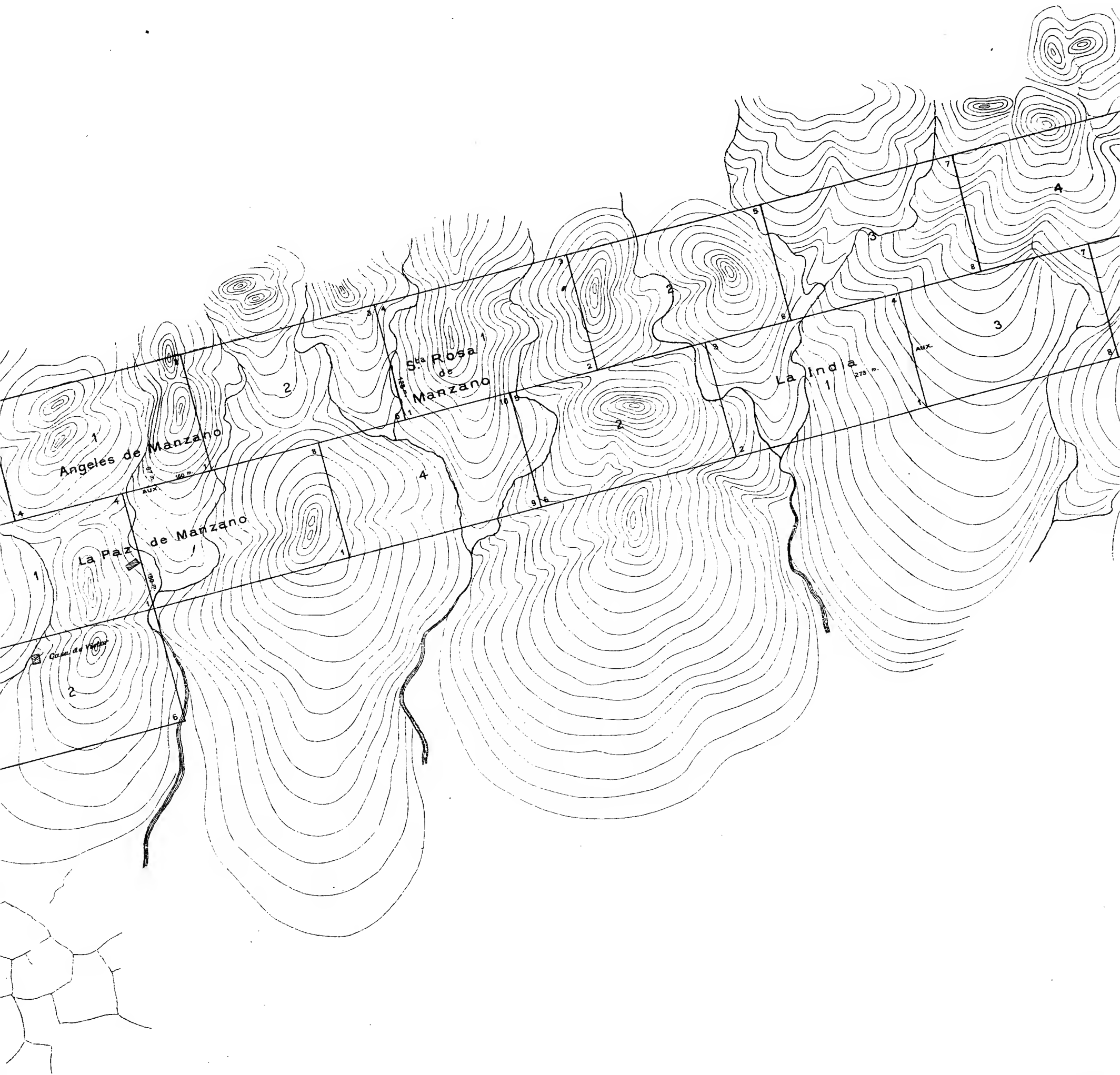
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